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THE BRICKBVILDER

OFFICE 85 WATER STREET BOSTON

BRICK AND MARBLE IN THE MIDDLE AGES.

G. EDMUND STREET.

CHAPTER VIII.

(*Continued.*)

THE last time I was here I found myself, in the middle of making a sketch of the west front of Sta. Fosca, suddenly struck by the strange likeness of its octagonal cloister to the most typical elevations of the Byzantine palaces in Venice. These always have a centre and wings divided by piers; and whilst the arches in the centre are of ordinary proportions, those in the wings are narrow and considerably stilted. In Sta. Fosca precisely the same effect is produced by the elevation of the three sides of the octagonal cloister, two of them being reduced in width and seeming to have narrow stilted arches, owing to their being canted and not seen in true elevation. I confess I could hardly help thinking that here I saw the accidental germ of an arrangement which, commenced in Romanesque or Byzantine buildings, was imitated in many of the finest of the Gothic palaces, and was revived with invariable persistency in the Renaissance.

The return to Venice was more pleasant than the journey out had been. The water had risen enough to cover the mud everywhere, and now a vast expanse of apparent sea was lighted up by the hot sun, and in the far-off distance the horizon was lined with the long picturesque range of the Alps, tender and transparent in hue, and sweet reminders to the dwellers on this monotonous lagoon of the world which lay outside their boundaries in the far north. On the road we stopped at Mazzorbo, where there is a dated example of a Gothic doorway. This has a square-headed opening, and above this an ogee canopy or label over a figure of our Lord, and some kneeling figures. The date inscribed on it is A. D. 1368.

EAST END, STA. FOSCA, TORCELLO.

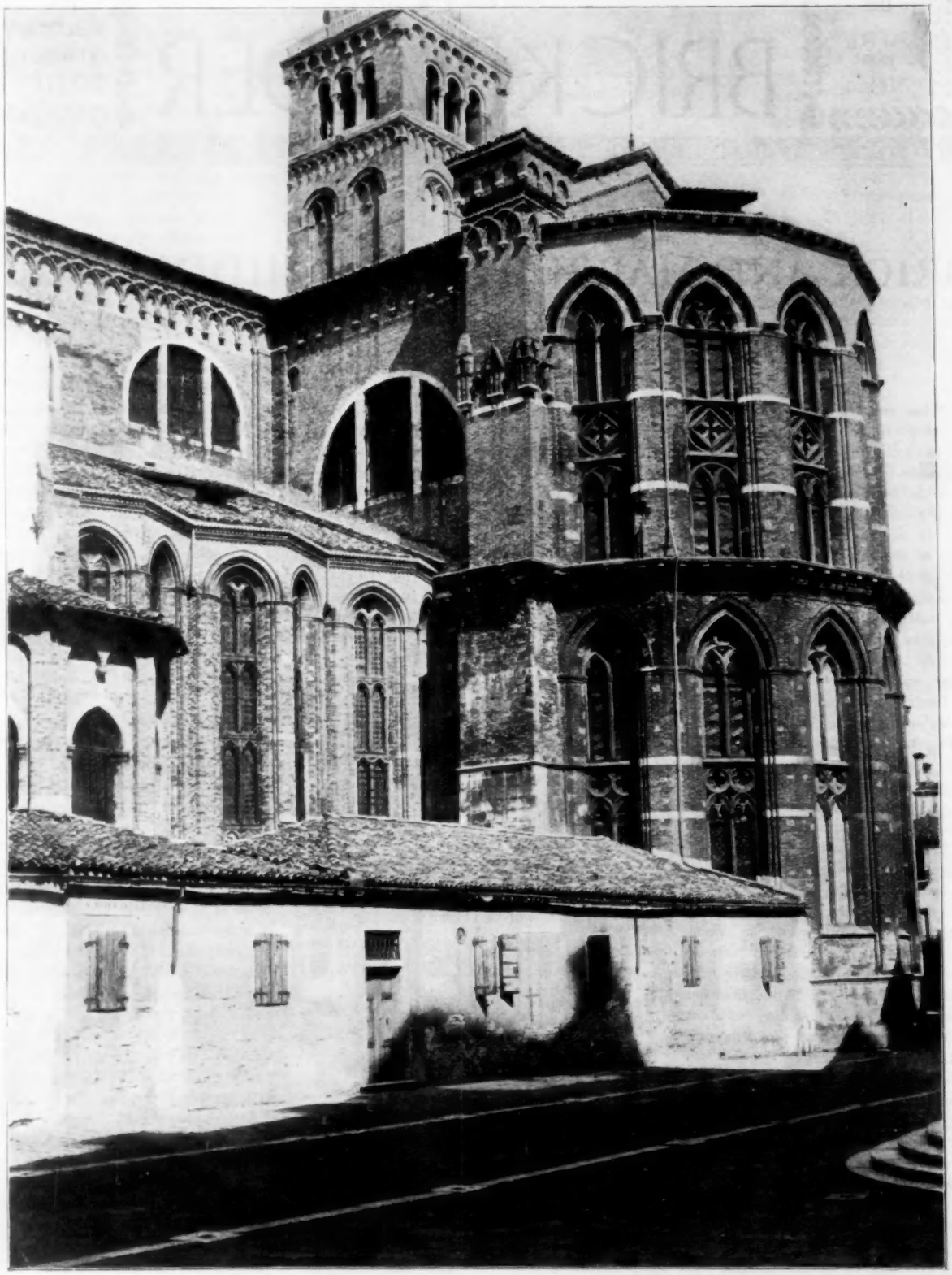
Farther on Murano is passed, and a halt made for a visit to the church of San Donato, once a building of the highest interest and well known to all readers of Mr. Ruskin's books. Unfortunately my first visit to this church was after it had been in part "restored," in the largest and worst sense of the word. The old brickwork was being renewed, plastered, and painted up, till most of its interest had vanished; and now, I fear, only those who saw San Donato some ten years ago can have any idea of its architectural value and interest. This was chiefly centred in the east front, where there is a central apse with a lean-to end to the aise on either side. The wall is divided into two stages, by a bold stringcourse and double line of chevrons formed by recessing the brickwork and inserting panels of colored and carved white marble. The lower stage is arcaded mainly in red brick, whilst the upper has a wall deeply recessed behind arcades under the eaves, with delicate balustrades between the columns which carry the arcades. This upper part of the building is mainly of buff-colored bricks, with thin lines of red to mark the pattern of arches, and it is curious that the light bricks are much larger than the red.[1] The pavements here are very fine examples of opus Alexandrinum, with a more than usual proportion of black marble, and there is a grand mosaic in the apse, of the Blessed Virgin Mary and our Lord on a gold ground.

One or two Gothic houses in semi-ruinous condition, and a very fine fragment of late Byzantine work quite in ruins, — the Palazzo da Mula, — remain in Murano, but of these there is such good store in Venice itself that we may pass them by.

Most visitors, I suppose, go to Murano in order to visit Dr. Salviati's glass and mosaic manufactory. He has succeeded in reproducing a material quite equal to that used in the old mosaics. Still more difficult feat, he has succeeded also in making glass so like the old Venetian glass in color, texture, and design as to puzzle all ordinary judges. I cannot sufficiently admire or praise the singular power which Dr. Salviati has shown in the education of his men. A party of six or eight made for me before my eyes, in a few minutes, a tall, delicate, and richly adorned goblet, in which every part was done by eye and fancy; no modern accuracy was attempted, and the result was a thoroughly beautiful and artistic work. All artists know how difficult it is to get a workman nowadays out of the hard mechanical groove of dull uniformity, and Dr. Salviati's success is an encouragement to all of us when we are tempted to despair of making the atempt.

From Murano a few minutes take us again into the watery streets of Venice. We have now seen the two buildings which ought first of all to be studied, Torcello and St. Mark's, and in them we have the key to everything that follows. The Venetians commenced in their earliest buildings with works which showed but little original invention or power. It was their fortune to have, by reason of their situation and their commerce, a great connection with the East. They received, therefore, a great impetus at the first from Byzantine art. Nowhere in Europe was so great an influence of the kind exerted; and

[1] The red bricks are 2¼ inches thick by 9⅝ inches long, whilst the yellow bricks are 3¼ inches thick by 12 inches long.



APSE OF THE CHURCH OF THE FRARI, VENICE.

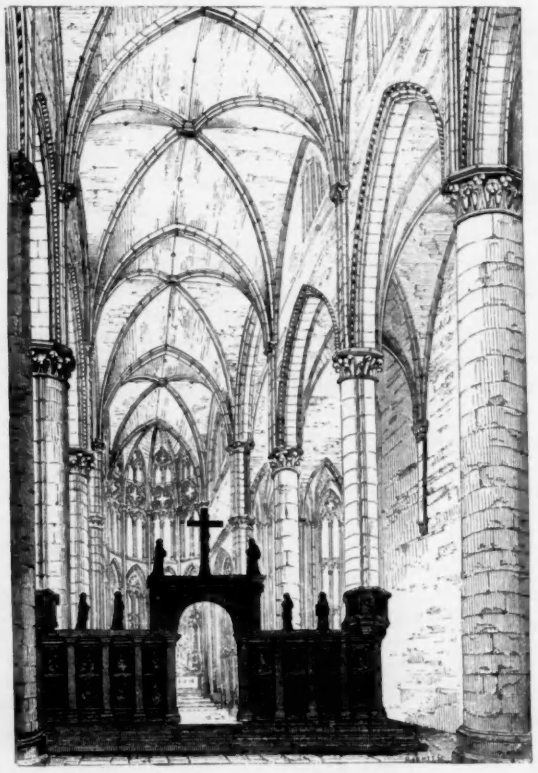
SUPPLEMENTARY ILLUSTRATION TO "BRICK AND MARBLE IN THE MIDDLE AGES."

to us, whose early architecture was almost entirely Romanesque in its origin, it has a special interest and novelty. But if the early Venetians copied Byzantine models, employed Byzantine workmen, and thought rather more of the beautiful colors for which their Eastern acquaintances gave them a taste than did their neighbors on the mainland, it must be frankly conceded that in later times they developed a very original form of Gothic out of these very materials, and owed comparatively little to any external aid in their great works of the fourteenth and fifteenth centuries.

The first business of a tourist in Venice is to secure a gondolier with intelligence enough to understand his proclivities, and patience enough to humor them. I have more than once or twice had to thank my gondolier for showing me old work which otherwise I should never have seen, and I am grateful accordingly. I am grateful, too, whenever I think of a gondola, for the most luxurious machine for sketching from which has ever been constructed; and the more so, when I recollect how for an hour at a time I have been persecuted in most Italian towns by all the idlest, dirtiest, and worst-behaved people of the place whilst I have made my sketches of their buildings. In a gondola in Venice one knows no such troubles, and the sketcher's life, as long as he can work in it, is as happy and undisturbedly serene as is possible. But no artist must suppose that everything worth seeing can be seen from the water; a few walks will convince him that, in the narrow *calli* as well as on the water-side much that is interesting is to be found; and when he has studied Venice both by boat and by pavement, he will find, as I do, that the subject is too large for a chapter, and requires rather a volume for its thorough elucidation.

The buildings of Venice divide themselves into two great classes, the churches and the civil buildings; of these the former is the smaller and the less interesting class. But as we have already seen at St. Mark's and Torcello the earliest examples of the churches, it will be best to say all that has to be said about them here, and to take the palaces and houses by themselves afterwards.

We have seen that St. Mark's was built in the eleventh and twelfth, and largely altered in the fourteenth century. Between these two periods little, if anything, was done in church building in Venice; or if it was, it has disappeared. Just as in Germany, the thirteenth century seems hardly to have existed for Venice, and we go at a bound from the simple, nervous round-arched work of St. Mark's to the here somewhat poor and tasteless churches of the fourteenth century. One or two small campanili — San Polo, San Samuele, and San Barnaba are the best — remain to show what the size and character of the earlier work were. They have plain arcades in the walls, rising from the ground to the belfry, and this has generally windows of two or three lights carried on shafts. At San Barnaba[1] a spire with parapets and pinnacles was added to such a steeple in the fourteenth century, the spire being circular in plan and build of round-ended bricks. San Paterniano has an hexagonal brick tower with two light belfry windows, also of Romanesqe character. The whole of these works are of brick, and usually the walls batter outward towards the base. In this respect, as in the general design, the great tower of St. Mark's follows those early examples, as also in its means of access to the top, which is a continuous slope in the thickness of the wall in place of the newel staircase in use all over the North of Europe. Finally, all these older works are very small and modest in scale and design.



INTERIOR OF STA. MARIA GLORIOSA DEI FRARI, VENICE.

Let us now give up all thought of early works, and see what the fourteenth and fifteenth centuries did for Venice in the way of churches. Taking them in their order of merit, we will go first to Frari, the church of the Franciscans, thence to SS. Giovanni e Paolo, that of the Dominicans, to the Madonna dell' Orto, San Stefano, the desecrated church of the Convent of La Caritè, now forming part of the Accadenia, San Gregorio, Santa Zaccaria, San Giacomo del Rialto, and some smaller fragments.

I must confess that on the whole, in spite of the grand size of some of them, I was rather disappointed on first seeing these buildings. One cannot but be impressed with the magnificent size of such a church as the Frari, with its many interesting details, and its monuments and woodwork. But in spite of all this, there is something wanting. I had not expected larger churches, but I had imagined that their style would be more pure, and at the same time more unlike what I was accustomed to elsewhere. The impression they left on my mind was decidedly that they were very inferior in almost every respect to churches of the same size and degree of ornament in the North of Europe, whilst in scarcely any point did they seem to me to have features which could with any advantage be imitated by us. I had allowed myself to expect a very different result, and was proportionately disappointed. There is no church in Venice (in what I am now saying I mean always to except St. Mark's) comparable either to Sta. Anastasia or to the cathedral at Verona in the interior; and the exteriors, though fine as examples of the bold use of brick, are nevertheless not first-rate nor at all superior to what one sees elsewhere.

Sta. Maria Gloriosa dei Frari ought first to be described, as being certainly the finest of its class. The first stone is said to have been laid on April 3, 1250, Nicola Pisano being the architect. The campanile was begun in 1361, under Jacopo Collega, and completed in 1396 by Pietro Paolo, his son.

The first impression of the church on landing from the gondola on the desolate-looking piece of pavement which here, as in many of the Venetian churches, forms a court between the canal and the west front, is not pleasing. The design of the west front is nothing short of being positively ugly; it is finished with a great sham gable, with a curved outline, somewhat akin to the degraded taste of our worst Jacobean art, and entirely without any beauty or even picturesqueness of appearance. The doorways, too, are particularly poor, consisting of a succession of twisted and reedy mouldings, thin and shadowless, like so many cords stretched from cap to base and round the arch, without any proper distinction of jamb and archivolt.

(*To be continued.*)

[1] The twelfth-century bricks here measure seven inches by two inches, and are built with a half-inch mortar joint; they are of red and yellow color used indiscriminately, and, though good and lasting, extremely rough in their make.

"Rational Building" is the title given the translation by George Martin Huss of M. Viollet-le-Duc's article, "Construction," in the Dictionnaire Raisonné de l'Architecture. Macmillan & Company, Publishers, New York.

THE ART OF BUILDING AMONG THE ROMANS.

Translated from the French of AUGUSTE CHOISY by Arthur J. Dillon.

CHAPTER II. — *Continued.*

SPECIAL CASES IN THE CONSTRUCTION OF VAULTS; MEANS OF STRENGTHENING; BUTTRESSES, ETC.

UP to this point the methods adopted by the ancients in the construction of vaults for obtaining auxiliary supports seem to have belonged to one of two types: to the system of armatures of bricks with radiating joints, either open networks or isolated ribs, or to the system of armatures of flat laid bricks, the thin linings. This classification is, of all that could be attempted, perhaps the least incomplete, but it fails to show the exact conditions. There can be no absolute division; sometimes the Romans made a choice between the two systems, but sometimes, on the contrary, their monuments show both types associated, as is the case in a hall of the Palatine (Plate VI.), where the vault has a system of transverse ribs carried on armatures of flat-laid bricks. The two methods of support are complementary, and the architect's aim was to unite in the auxiliary works the continuity of the lining with the rigidity of arches with radiating joints.

In matters of construction it may be said that the Romans had no fixed and general rules; the needs and resources varied infinitely, and the Roman builders wisely judged that rigidly unchangeable methods were not compatible with such a diversity in the conditions to be met. Hence, there is to be found no exclusive preference for any particular material, or for any particular form of structure. In Rome, brick was used for the armatures of the vaults; in Pompeii, for example, the material of the armatures was entirely different, and in consequence the aspect of the vaults was greatly modified. The architects no more limited themselves to the use of squares of baked clay than to the forms of the ribs and linings used in Rome. They still kept the auxiliary support between the temporary centering and the body of the vaults, but there is no longer found an equivalent of the cunningly built armatures we have been studying. Here all was reduced to an unbroken crust of tufa mixed with mortar, to a species of paving of small stones which enveloped the centering with a continuous covering; the armature was transformed into a thin vault of almost entirely rough material, which, like the linings of flat-laid bricks, sustained the entire weight of the upper part of the vault itself. This method of support, which is that of the greater part of the vaults in Pompeii, is plainly visible in the galleries of the two theatres, in the rooms in the lower story of the house called that of Diomedes, etc.

In Verona neither bricks nor tufa, but the round tiles of Adiga, were employed for the same purpose, and alone formed the envelope of the centerings and the support of the vaults in the corridors of the amphitheatre.

Finally, when the vault was of small span, and only slightly raised above the level of the ground, the Romans, changing their methods, used neither centering nor armatures, but moulded the vault, as it were, on a core of earth. This is the case in a vault discovered in the ancient cemetery of Vienne;[1] this is also the case in the vaults that honeycomb the walls of the sub-basement of one of the principal temples that rise on the platform of the Palatine. In this second case the earth that served as the mould remains in place, just as it was heaped up by the Roman builders.

Thus the methods of economizing in the provisory works changed, though the fundamental thought remained the same; and I wish to show, by a few more variations, how many were the aspects under which this idea presented itself in ancient days.

I have spoken only of vaults with curved surfaces: the curvature of the centerings was in itself a complication, and the Romans pushed their search for economy to the point of making the surfaces plane. This was attempted in the theatre of Taormina. The large niches have, instead of a vault with a curved intrados, a sort of broken ceiling, a pointed vault (Plate XV., Fig. 5); this queer form can best be conceived as being an ogive, where each leg is a straight line; the centering in a vault of this kind could evidently be made of two abutting joists. This instance, moreover, should not be thought to be an isolated example in Roman architecture; I have observed the same artifice on the plain of Rome, not far from the round end of the Circus of Maxentius, in ancient constructions of modest aspect, where the long vaults had a broken outline like that of the niches at Taormina. The centering of these vaults can be likened, with the greatest exactitude, to the framing of a gable roof. It would be impossible to push further, or to apply more freely, the principles of economy which I have been endeavoring to put in their true light.

With this liberty in the choice of methods, there was no circumstance which the Romans could not put to profit. They recognized that the materials pressed more heavily on the armatures at the summit than at the springing of the vaults, and they therefore sought different arrangements at the two points. Thus the arch shown on Plate XV., Fig. 2, is built at the springing of solid masonry of large bricks, while at the summit it is reduced to an open network carrying a mass of rubble. Thus again (same plate, Fig. 1) the great arches of the lower story of the Pantheon are built, at the springing, of interlocking bricks, and above consist of three concentric and independent arches, of which the first, once in place, served as a centre for the others.[2]

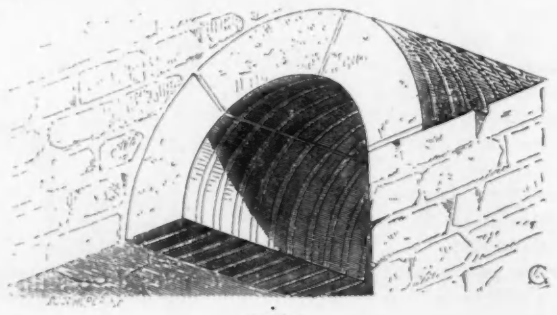


Fig. 52.

Moreover, we find the Romans utilizing the adherence of the mortar in order to build small vaults entirely without centerings: this can be seen in certain aqueducts in Greece, of which one can take as an example that of the Propyleæ of Eleusis.

The bricks, in the shape of a circular sector, are laid in thick beds of mortar; the two bricks at either side (Fig. 52) are easily put in place and stick to the section of the vault already finished; then the third key is put in the open interval, and the vault is thus completed without any centering whatsoever.

When the Romans had to strengthen a vault at any particular point, when for instance it was necessary to support an additional weight, a partition, for instance, they put aside, for the moment, the practice of building the ribs flush with the rubble and made them salient; sometimes these were carried on pilasters, but ordinarily

[1] To-day destroyed. See for the details of this vault the work of M. Le Blant on "Les Inscriptions chretiennes des Gauls" (Tome II., p. 125, inscr. No. 454): an engraved stone, in the embankment forming the core, left an imprint on the masonry clearly showing the method of construction.

[2] These arches served to carry the weight of the upper part of the vault on to the solid parts beneath: that is, they are relieving arches. They are almost entirely filled with masonry, but it is clear that they were filled after being built on centres. To use the filling of arches such as these as the centering, would be to fail to attain the desired end, for it would be obtaining the exterior appearance of relieving arches while really there would be a continuous wall, which would transmit the pressure vertically, just as in the absence of keyed arches.

they were salient only near the top, the lower part remaining flush (Fig. 53). Thanks to this arrangement, the vault was strengthened at the overloaded points, while the pilasters were suppressed, and the hall, remaining unencumbered with projections, had smooth and continuous walls about its entire circumference.

It would be, I think, superfluous to multiply the examples of special arrangements used under differing circumstances; there can be seen in them all the same manifestations of the same principles of studied economy, which everywhere, in spite of the diversity of their applications, show themselves with the same clearness. Having thus gone over the methods of construction as far as necessary, I will pass on to the question of the thrusts of the vaults.

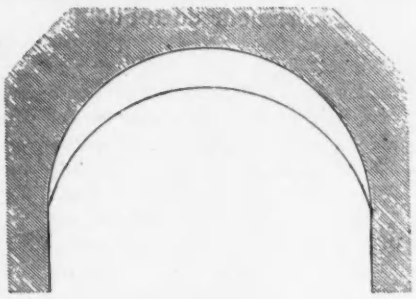


Fig. 53.

At the first glance one may be inclined to ask himself if this question of thrusts should not be put aside as being foreign to the system of construction we are studying; for it is not, in fact, the problem of meeting the thrusts of a keyed arch: here all the parts of the vault adhere to one another, and we have a homogeneous mass, a monolith, and it would seem sufficient to give it a bearing proportional to its weight. It is one of the great advantages of monolithic vaults that they will stand without any auxiliary props, and this property was too elementary to escape the notice of the Roman builders. But they also perceived the danger of counting entirely on it. A vault, when finished, takes its final shape more or less slowly. It bends, sometimes for a considerable period, and the summit drops little by little, while the lower parts have a tendency to spread. To allow these movements to take place was to run the risk of serious damage while they were occurring; and, when they ceased, the vault would be in a state of interior tension comparable to that of a spring resting on two supports. It is not thus that the masonry should be allowed to act; it was better to prevent the deflection; and the surest means of doing so was to rigidly hold, between powerful spurs, the flanks that tended to move outwardly. This was, I believe, the origin of the buttresses used for the ancient vaults, of whose form, importance, and arrangement one can get a general idea from Fig. 54.

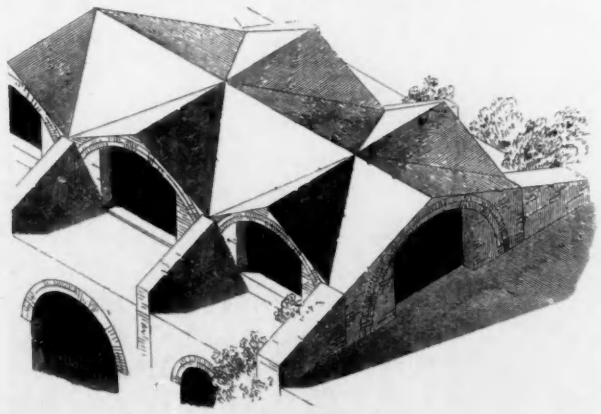


Fig. 54.

The buttresses of St. Maria Maggiore were like this, as well as those of the Temple of Peace, and except for a few unimportant details, those of all the great groined vaults, erected by the Romans were the same. The halls, covered by barrel vaults, had buttresses of smaller projection, and they were less often used, while in circular edifices it is the exception to find them about the drum. This gradation is so natural that it is sufficient to state it.

In general the Romans employed these exterior buttresses with much reserve. In strengthening the vaults, as well as in all other parts of their buildings, they avoided them as far as possible; and instead of building great masses especially to hold up the vaults, that would serve only to strengthen the edifice without other utility, they sought to obtain buttressing by a suitable grouping of the different parts of the buildings; and in this respect the careful study of the planning of their great monuments gives much valuable knowledge. I will not undertake to describe a series of combinations for obtaining equilibrium, which are as simple as they are ingenious, but which cannot be given any methodical classification. The ideas which prevailed are clearly enough indicated, and one can easily perceive the animus of the method which guided the Romans, by examining the plans of some of their great edifices, such as the Baths of Caracalla, of Diocletian, of Titus, the Palatine, etc., etc. One can there see with what care and with what fertility of expedients the Romans avoided the works intended only to assure the stability of the vaults. Almost all the parts which have this function are at the same time profitably used on the interior for the purposes for which the buildings were erected.

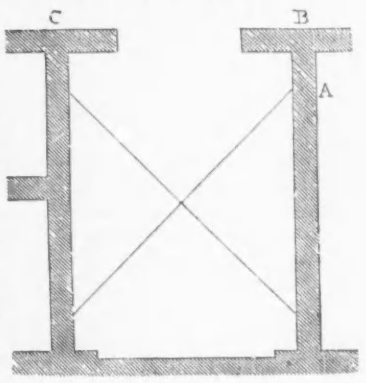


Fig. 55.

If it was a question, for instance, of buttressing the groined vaults of a rectangular hall, instead of starting the groins from the angles of the hall, which would have necessitated the use of projecting buttresses, they placed them at a certain distance from the exterior wall, BC (Fig. 55). The extreme end of the side wall, AB, served as a buttress, and, provided that the hall was longer than it was wide, they could combine this advantage with those connected with the use of groined vaults on a square plan (Fig. 40); and at the same time the buttresses were incorporated in the edifice, so that the useful space was increased, with no corresponding increase in expense.

This arrangement is met with, one might say, wherever there are intersections of barrel vaults. The Baths of Caracalla in particular, have numerous and remarkable examples of it.

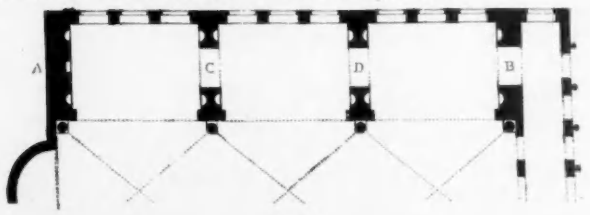


Fig. 56.

The same idea presents itself in a different form in the Basilica of Constantine. The groined vaults of the central nave had so great a span that they could not be left to themselves without the support of heavy buttresses, and for these were used the tranverse walls A, B, C, D (Fig. 56). But instead of leaving these like spurs against the piers of the great central vault, barrel vaults were carried between them, and the space thus covered in was used as a lateral aisle. They then ceased to be encumbering auxiliary works about the exterior of the edifice, and were, properly speaking, no longer works especially for support, but came under the ordinary cases where the parts of the edifice mutually buttress each other. Nevertheless, when they were free to choose, the Roman architects instinctively preferred the more simple way of exaggerating the thickness of the piers, building great cells in them, which made the increase in thickness less costly, as in the Pantheon (Plate XIII.).

(*To be continued.*)

Profile of New York from the Battery to Brooklyn Bridge

Recent Brick and Terra-Cotta Work in New York.

AS we approach New York from either side, nothing could be more conspicuous than the group of overtopping office buildings that have been of late years erected. The spire of Trinity Church, that of old dominated the city, has become an unimportant obelisk, scarcely noticeable in the midst of higher and more massive blocks of outline by which it is surrounded. Each one that is newly built, outvying the earlier in height, becomes in turn the wonder of the moment. First the World Building reached an unprecedented number of stories. After that the Manhattan Life, with its sixteen stories, made the Union Trust, with its poor eleven stories, seem quite matter of course. And now people are wondering by how much, when finished, the American Surety, with already eighteen stories, and more to come, will tower above the Manhattan Life.

There are in the lower district of New York, from the Battery to Chambers Street, fifteen or twenty buildings that are ten stories or more in height; most of them twelve or thirteen, some sixteen, eighteen, or twenty.

Crossing the Brooklyn Bridge, from which the sketch at the head of this article is taken, we turn down town along Printing House Square. Passing over the World and Times buildings, which are too old to be called recent, in these railroad times, — six or seven years the youngest of them, — we enter the canyon called Nassau Street, at the mouth of which rises, on the right the Times, on the left the Tract Society's buildings. The latter, above the five stories of stone already built, gives promise of fifteen or sixteen stories more of brick and terra-cotta; but it is not yet far enough advanced to comment upon; nothing but a gaunt iron scaffolding, dark brown-red against the evening sky.

At Beekman Street we come to a very creditable effort, the Vanderbilt Building extension, a fourteen-storied, square-shouldered mass. The basement, by which I mean, not an underground story, but the architectural bottom of the design, comprising four stories, is of stone, done as properly as McKim, Mead & White, the architects, usually do things, but not brick or terra-cotta, and therefore not now to be especially spoken of.

Above this come ten stories of buff brick, without anything that can be called enrichment: nothing but a treatment of brick quoining carried across the front, which is very judicious. The top stories vary somewhat. There are pilasters and capitals discernible, but they count for little at so great a height. The whole is topped by a copper cornice, not so bad as one of sanded galvanized iron, but not precisely what we should like to see there.

Following the picturesque line of Nassau Street, the most satisfactory street in New York, from an artist's standpoint, with its succession of slight hills, its sinuous course, not so sharply curved as to cut off the distant view, and the continual variation in width, after the Dutch fashion, we come to two buildings at the opposite corners of John Street, which neither challenge admiration nor need condemnation. Plain, straightforward, business buildings they are, the Prescott and the Sheldon buildings, the one ten, the other twelve stories high, of both Clinton & Russell are the architects. Simple, reasonable masses of brickwork with some slight adornment of moulded brick and terra-cotta, but not making any pretence at being works of art.

Leaving Nassau Street, we turn down Maiden Lane, and come next to the Lawyers' Title Insurance Building, done by C. C. Haight.

All of the enrichment here is in stone; the four lower stories and the three uppermost stories are entirely of stone, in very rich and massive Renaissance, the sky line being adorned with big dormers and chimneys, and peaked roofs, that are very good indeed, in their way. The middle six stories, making thirteen in all, are of light buff Roman-shaped brick, laid with the most perfect plainness of treatment conceivable, but than which there could be none more effective in this particular place. There is nothing — absolutely nothing — to these six stories but a flat brick wall with square-headed, sharp-edged window openings in twin groups of triplets. The reveals are sixteen inches deep, quite in keeping with the massive stonework below, and giving to all the buildings around, the little five and six storied ones, I mean, with their four-inch reveals, a curiously flimsy, threadpapery look, and quite overpowering a tall, twelve-story, narrow-front building near by.

A little farther along, at the crossing of Maiden Lane and William Street, we come to what I think may be considered, whether

UNIVERSITY BUILDING. ALFRED ZUCKER, ARCHITECT.

we admire it or not, the most noteworthy attempt at a design that can be found among the new steel-frame buildings anywhere.

An effort has been made, and I think successfully, at making a very tall building a really pleasing thing to look at.

It must be remembered that there is nothing that tries the power of a designer more than a very high building; most of all such high buildings as are necessarily built for modern business buildings.

When to the demand for excessive height is added an extreme restriction in the area of ground to be occupied, the problem becomes almost hopeless. What, for instance, can a designer do with such a building as the Decker Building on Union Square (to skip far up town for a moment for a suitable example)? A lot perhaps thirty feet wide, on which we must build a twelve-storied building.

A treatment can readily be devised for a tower thirty feet square, but what are we to do with flat parallel walls, running back a hundred feet or more, making our effort look like a slice of cake standing on edge with the icing decorations on the front?

Yet here at the corner of Maiden Lane and William Street, on a lot only about twenty-five by seventy-five feet, at a guess, a really picturesque building, the John Wolfe Building, has been built by the architect.

It is all of red brick with light colored stone trimmings. For the sake of THE BRICKBUILDER, we may regret that the adornments are not of terra-cotta, but the availability of plain red brick, when well used, is so well illustrated, that we can hardly do better than dwell on it for a few paragraphs.

Twelve full stories, with a cockloft added in the high-peaked roof. Twelve stories, all of red brick, with a great abundance of stone trimmings throughout, quoins, voussoirs, beltcourses, colonnettes, copings, towering upward with crowstepped gables and dormers, and balconies and bays; all most skilfully and logically worked out. The style is a free Flemish Renaissance, the rather fantastic details being apparently deliberately chosen, to give them some chance of asserting themselves at the top of and upon the sides of so great a mass; and they do assert themselves, not unduly either, but just about as they should.

CONTINENTAL INSURANCE COMPANY BUILDING.
CLINTON & RUSSELL, ARCHITECTS.

The north end of the lot has one angle much too acute for good effect if the building were carried out to the extreme point of it all the way up. It has been accordingly truncated in a most skilful way, and with much careful study, — study in which I can fancy the architect must have taken much pleasure, which, indeed, should be the accompaniment of all artistic effort.

For five stories upward only a small corner is cut off, sacrificing as little floor space as possible. The corner of the sixth story is cut a little farther back, leaving the portion below as a projecting bay. This second setback reduces the narrow front to two equal faces, forming an obtuse angle with each other. As an obtuse angle is not a very happy central feature for a design, at the eleventh story the obtuse angle is itself cut back, leaving a little triangular balcony, the face formed by cutting off the angle, together with the flanking faces, standing at a slight angle with it, are all included in one large crowstepped gable, with a multitude of moulded stone copings and courses, and a much enriched semicircular tympanum over all. On the long side are large dormers, two of them, carried through two stories, and fashioned into similar picturesquely outlined gables.

There is not a better studied piece of design in New York, nor one that shows better results. The successive retreating steps where the stories set back at once give value to the height, and relieve the box-like appearance that is especially hard to avoid where there is excessive height.

But two minor points occurred to me which might be questioned. One is that perhaps the reveals of the windows have been somewhat frittered, by bevelling and by double orders, both of which are used very generally throughout; but the surface effect obtained may have been, after all, what was aimed at. The other point is that the cornice over the tenth story on the long side seems rather too strong to be quite in keeping with the perpendicularity of the rest of the building.

As we walk around to the rear on Liberty Street and note accidentally with pleasure an interesting carved stone heraldic beast in an odd corner, we become conscious of a dark overshadowing nightmare near by, of I know not how many stories nor by whom architected, nor would I tell if I did; so much may kindness conceal.

At a distance up the defile of Liberty Street may be discerned the sixteen stories of the rear of the recent new portion of the Mutual Life, seven stories more than the nine of the original building, and twelve stories above the unimportant five stories of adjoining ordinary everyday affairs. Only the rear of the Mutual is of brick and terra-cotta, and not worthy of much comment, except of brief commendation for the happy expedient, from an architectural point of view, of leaving out the windows next to the angles of the building, thereby achieving an effect of unwonted solidity; though I should doubt its felicity from a real-estate agent's point of view; but after all the new part is only intended to give more room, and is unavoidably an ugly mass, not deserving serious thought and clearly not intended to provoke criticism.

In Cedar Street, not far from William, we encounter the Continental Life Insurance Company's Building, by Clinton & Russell, an affair of no small pretension and considerable merit. It has the advantage of a reasonably large frontage, as frontages for high buildings are nowadays reckoned, which I should guess to be about eighty feet. At any rate, there are in the lower stories five voids, each of which contains a double opening above, and the corresponding six piers. Counting the voids at eleven feet, and the piers at four, makes about the eighty feet of front. Here again the lower stories are of stone, two of them in this case, but each of more than ordinary height, so that the two seem equivalent to three or four of the stories above. This stone treatment of the lower stories seems to be the accepted method in New York's high buildings; done, no doubt, partly because of the sense of solidity which attaches to stone, that we must admit in spite of our attachment as brickbuilders and brick admirers to brick, partly because of the sense of costliness, richness, in a word, "handsomeness," that in the popular mind, if not in the architect's, is indissolubly associated with stone.

Above the two lowest stories this Continental Life Building is all of brick and terra-cotta. White, or nearly white brick they are, of the so-called "Roman" shape,—indeed this shape seems to be generally preferred,—standing piled in great piers running through six stories, the fifth to the tenth inclusive, and uniting in a story of semicircular arches that form the eleventh story. Over this again is an arcade of smaller arches, two to each main arch below and comprising two stories, the twelfth and thirteenth, with a good terra-cotta cornice on top of all as it should be, very much enriched, as are also the arches and piers immediately below it. The main shaft of the building, if I may so term it, is rather plainly treated, with rustications formed by setting back a course of brick at every twelfth course. The third and fourth stories, I had forgotten to say, coming just above the stone basement, are also treated as belonging to the lower part and not to the shaft. A building altogether very creditable and imposing.

Immediately opposite, fencing up completely at this point the narrow street, is the Stokes Building, by the same architects, of very

STOKES BUILDING.
CLINTON & RUSSELL, ARCHITECTS.

much the same dimensions as the Continental Life, and quite challenging comparison, being of about the same frontage, twelve stories high and of a similar disposition of the façade horizontally in five main arches, each containing two windows above the lower stories. Here again the first three stories are of stone treated in simple channelled quoins which follow down the lines of the voussoirs of the arches that form the third story. Above again it is all brick and terra-cotta, but this time a warm brown brick, much more grateful to the eye than the buff brick, but no doubt sadly darkening the streets if universally used. Again we have a story of the brickwork made part of the base of the main piers above, with a very well done terra-cotta anthemion ornament stringcourse. Still again we have comparatively plain massive piers through four stories more, their arches comprising the next and ninth story, and then a very rich tenth story arcade and cornice, and in this case a two-storied attic.

Designed, evidently, by as scholarly a hand as did the Continental Building, except, perhaps, the attic above the cornice, yet this last is accepted by so many able designers that we must not be too hard upon it, although it never seems quite right; yet, as a whole, the building, in the indescribable sympathy of the mind that it produces, far

HAVEMEYER BUILDING.
GEORGE POST, ARCHITECT.

surpasses the colder charm of its neighbor opposite. But good by to it now; there are a few more that we must at least mention.

Many of the most noteworthy buildings have the fronts all of stone, and are consequently not to be discussed by us. Brick and baked clay are alone our theme. Some of them, however, have frontages upon a back street which are done in brick, showing how excellently brickwork will stand comparison with stonework. One of such is the Manhattan Life, on lower Broadway, backing up on New Street; Kimball & Thompson, the architects. The New Street front is entirely brick and terra-cotta, gray in color, a very pleasant color it is too, very good in design, and running skyward nineteen or twenty or perhaps even more stories, I got tired of counting them and continually discovering extra ones that a casual stringcourse of eight inches' projection had quite concealed, owing to the foreshortening from a nearby standpoint.

The terra-cotta detail of this building is particularly good, although it impressed me as somewhat too profuse, and too evenly distributed, although that again may have been the effect of the foreshortening; when I have a chance I shall get on the roof of the ten-story building opposite, that I may view it to better advantage at the middle of its height.

Adjoining the Manhattan Life is the Union Trust Building, also with a brick front on New Street, which, in its day, was reckoned a very high building, with its ten or twelve stories, but is little to brag of as far as height is concerned, alongside of its nineteen or twenty-storied neighbor. As to other matters than height though, it is much to brag of. I have heard it counted by those who know, and I am inclined to count it myself, as the best office building that Mr. George B. Post, the architect, ever did, perhaps the best that anybody ever did. In symmetry, in the simplicity of its triple division, it excels the Times Building, by the same architect. It is in the same style as the Times Building, but the detail is not at all equal in freedom to that of the latter.

There are other brick office buildings, a plenty, but for the present we have had about enough, and certainly the best of them. I regret only that the limitations forbid any mention of stone front office buildings. Of these latter there are two, the Postal Telegraph and Home Life, that stand alongside of each other, much to each other's detriment, but illustrating an interesting point,—the comparative merits of the cornice and the broken-line steep-roof termination. The latter I am disposed to favor. The cornice, never very logical outside of Greek usage, Michael Angelo and the Italian palaces notwithstanding, seems especially unfortunate as a termination to a building of a couple of hundred feet or more in height.

There is no reason why the top should not be made the best part of a high building, used, for example, somewhat as the dome of the World Building is used, as the office of the company owning the building, with the advantage of light and air on all sides that cannot be cut off, and a roof-garden too, if that is desired, or a series of such in terraces.

Such an arrangement is susceptible of adaptation to many purposes. If not all the offices of a company, at least the president's or directors' rooms might be so placed; or the restaurant, which is often in the top of high buildings, might be surrounded by a delightful open-air summer garden.

JOHN BEVERLEY ROBINSON.

(To be continued.)

A DESIGN FOR THE PROPOSED HIGH SCHOOL, PLAINFIELD, N. J.

BY W. & G. AUDSLEY, ARCHITECTS, NEW YORK.

(See Plates 31, 32.)

THE style of architecture selected is one well adapted for a building of a public character, in which brickwork and terra-cotta are to be used.

The façade is treated in a symmetrical manner, having the main block, which contains the principal entrance and the assembly-room, advanced so as to form a leading feature in the design. This is of greater height than the rest of the building, owing to the necessity for a high ceiling in the spacious assembly-room on the second floor. The principal entrance is in the form of a projecting open porch, to which an effective character has been given by the use of simple and appropriate architectural features in strict harmony with the style and general treatment of the building. Flanking the central block are the gables of the side wings of the building, set back so as to give additional prominence to the central portion, and treated with due regard to architectural effect. These wings are of sufficient height to meet the demands of the basement, first floor, and second floor. The sides of these wings are designed in a simple but consistent manner, being relieved by the important lateral entrances to the building.

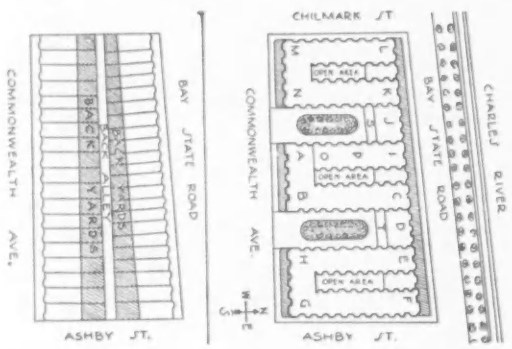
Throughout the design due regard has been paid to economy of material and skilled labor. Architectural effect has been secured by proper proportion and grouping of simple features, producing marked contrasts of light and shade, rather than by rich and expensive details and ornamentation. The maximum of architectural effect has been sought for with the minimum of expenditure.

The arrangement of the interior is thoroughly convenient, and the most perfect system of ventilation is introduced. In this design all the accommodation stipulated by the School Board has been carefully and fully furnished.

THE COMMONWEALTH HOTEL, BOSTON, J. P. PUTNAM, ARCHITECT.

THIS building, on the Riverbank lands between Ashby and Chilmark Streets, with a frontage on Charles River on the north and Commonwealth Avenue on the south, will consist of three pavilions extending from the river front to Commonwealth Avenue.

The three pavilions are separated by open courts seventy feet wide each, protected on the north by the one-story dining-room, connecting wings and affording sheltered carriage entrances on the south.



The central pavilion contains the main office and reception-rooms. The office commands a view of all the guests' entrances, four in number, of the entire hotel.

Each wing has a smaller open court thirty-five feet wide in its centre, making five open courts in all. The three smaller courts are open to the river on the north, the dining-room only being carried up at these points. Thus every suite has a view both of the river and of Commonwealth Avenue, and also direct sunlight, and every room has a view of either the river or Commonwealth Avenue or both, except some of those on the first floor.

All three pavillions are eleven stories high or 125 feet, the height limited by the building laws of Boston, excepting the towers, which are allowed to exceed this limit under special provisions as to their construction and use. In the central pavilion the eleventh story is treated differently from that of the two other pavilions for architectural effect and to provide retired rooms in the two end pavilions for the service, not visible from Commonwealth Avenue, except at a great distance from the building.

The open courts and entrance portico and arcades furnish the elements for producing a rich effect of light and shade, and considerable picturesqueness without loss of simplicity and dignity. The materials proposed for the façades are dark red terra-cotta enrichments on a body of buff or warm gray brick with a darker buff for the basement and first story. The style and coloring have been suggested by the very beautiful palace of the Grand Duke of Mecklenburg-Schwerin in North Germany. The effect is extremely rich without being costly, the warmth of color of the materials contrasting admirably with the cold grays and blues of the sky and river, and with the foliage in Commonwealth Avenue, in the courtyards and the river park laid out by the landscape gardeners of the Charlesbank.

The arrangement of the suites is somewhat novel, particularly as to elevator service. There are in all twenty-one elevators in the building, so placed that each suite shall be served by one, and in case two suites are united to form a single large suite, one of the elevators forms a front and the other a rear or service elevator. In other words, all the large suites are served by two elevators, and these large suites are so designed that they may be divided at any time in the future into two or three suites.

In virtue of this treatment of the elevators, it has been possible to avoid the usual waste of room occasioned by long passageways, the extra elevators much more than paying for themselves in this economy of space. All the large suites are arranged in tiers from second floor to top story, so that the elevators shall all be used for the same service in any teir of rooms. Each suite is provided by one or more bathrooms, and each bathroom by an ample and well-lighted dressing-room in the rear of the bathroom and separated therefrom by leaded cathedral or fluted glass partitions. The arrangement of other matters and details of the suites and of the managing and serving rooms, kitchen, storerooms, lighting, heating, ventilating, mailing plants, etc., and of the fireproof construction, are being carefully studied out by a specialist in hotel and apartment-house construction of twenty-four years' experience.

Particularly favorable opportunity is furnished by the conditions of the site for the convenient handling and storage of provisions, and for the handling and transportation of baggage and furniture, all stores and furniture being conveyed on small cars running on tracks from the basement service entrance on the side street directly to the elevators in the basement and thence to their destinations without leaving the small cars or trucks until they are deposited in their proper places in the rooms for which they are intended. The elevators and passageways are everywhere made capacious enough to take the largest pieces of furniture without crowding. A very large boiler and ventilating chimney, constructed to take away entirely all odors of the kitchen and other service-rooms, is shown in the perspective and forms an ornamental feature in the design.

Each pavilion shows a different arrangement of rooms in the suites, and different forms and sizes of suites, some housekeeping and some non-housekeeping, the housekeeping suites being arranged to be convertible into non-housekeeping, and *vice versa*.

A one-story grand ballroom, between the banquet hall and the reception-rooms and parlors, is shown in the central pavilion. As previously stated, it is proposed to build only a part of the structure the first year, and add to it from year to year as the demand justifies.

TO DRAUGHTSMEN.

ANY draughtsman out of employment, who will send us his full address and answer the following questions:—

By whom were you last employed?
Can you furnish good recommendations from your last employer?
On what particular line of work have you been engaged?
What salary do you expect to receive?
Are you willing to go to another city?

may have his name placed in our Exchange Bureau, and will be notified of any parties desiring his services as a draughtsman.

All such communications will be regarded as confidential, and no charge will be made.

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WE call your attention to the forgoing announcement, and upon your application would be pleased to put you in communication with any draughtsman whom we think would meet your requirements. All communications will be regarded as confidential, and no charge will be made.

Address, EXCHANGE BUREAU,
THE BRICKBUILDER PUBLISHING CO.

We would like to arrange with a draughtsman in each of the following cities to furnish us with a monthly letter which shall be a review of the important building being done or contemplated in their respective cities: New York, Brooklyn, Buffalo, Cincinnati, Pittsburgh, Indianapolis, and St. Louis. Address, The Brickbuilder Publishing Company, Boston.

THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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COLOR IN BRICK AND TERRA-COTTA ARCHITECTURE.

IT must be admitted that the question of color in architecture is one which is worthy the most careful study of our ablest architects. That it has received such study we all know, and yet there appears to be a hesitancy on their part to launch out upon the ocean of possibility which now lies before them in the direction of the use of special colors in brick and terra-cotta.

Within the past ten years a great impetus has been given to the production and use of special colors in architectural clay products. Ten years ago fully four fifths of the terra-cotta produced was red. Now, hardly one fifth is of that color. Buffs and grays of several shades, white and cream-white, and the richer, warmer colors of the fire-flashed old gold and mottled have come, and have evidently come to stay.

Of the same colors are the bricks, in unique and graceful forms, heretofore unknown among us, giving the architects much greater opportunity in the display of artistic taste than has ever before been enjoyed by the profession.

It may be said that our architects do not pretend to be color artists. That may be, but many of them are color artists of the highest order, and to these a great opportunity is given by our modern brick and terra-cotta manufacturers in the great variety of soft, natural colors which are now produced.

Messrs. Blackall & Newton, of Boston, have taken a step in the right direction in the treatment of the new Tremont Temple. The terra-cotta blocks of varying colors are very effective, and the success of this effort should encourage others in the same direction. Every one is familiar with the beauty of seam-faced granite. Take your stand, for instance, in Copley Square, where you have a good view of the New Old South Church, note the varying colors. Where would be the beauty if every stone was identical in shade, and yet the contrast is very great? It is only when taken *en masse*, and the colors blend together in a soft harmony of tone, that its real beauty is seen. Such effects can be produced in bricks, the sizes, twelve by one and one half inches, being especially well suited for this, as the fine lines of color blend more perfectly, and produce an effect most pleasing to the eye. Looking at such a building a short time ago, a business man remarked, "I do not know what it is about that building, but the more I see of it the better I like it. It has made such an impression upon me, that sometimes in the night when I am wakeful I call to mind its graceful lines and the blending of the colors of the brick, and I drop off to sleep."

I would like some architect to tell me whether he should consider such a remark a compliment or otherwise. I am sure there are some buildings so remarkable in form and color as to produce in the mind of the innocent beholder such a feeling of unrest and dissatisfaction as effectually to prevent sleep.

The advent of this class of brickwork has brought out many interesting discussions among architects, builders, and owners, and the history of some of the buildings, where they have been used, has been at times even exciting. Let us take a typical case. A syndicate is to erect a large business block. The building committee and the architects send out for samples of different bricks. These are spread upon a table and are considered by the committee. A brick of certain color is finally agreed upon, and while it may be said by some one present that the bricks will not all run of an even shade, yet quite likely the members of the committee will not fully appreciate this fact, and will really expect to get a brick almost identical with the shade of the one selected. The order is given to the brick manufacturer, who begins to deliver the goods. All at once a great cry is raised by the committee: "These bricks will not do at all. Our building will look like a checkerboard with such a variety of shades." It is explained that when these bricks are set in the wall, the disparity of shade, so apparent when only two bricks are compared, will largely disappear, and when seen *en masse* the colors will blend, producing a most pleasing effect. But the committee know better: "You need not tell us any such plausible story. Our building will be spoiled by the use of such brick as these. They must be taken away. Look at Mr. John Smith's building. What a fine looking front! We do not propose that ours shall be less beautiful and effective than that." "Well," says the brick manufacturer, "will you be satisfied with as even a shade as in the building you mention?" "Why, certainly," is the reply. "That is just what we want." The manufacturer then selects, from the pile of bricks before them, two of the extreme shades of color, and asks the committee to go with him to John Smith's building. They do so. The committee stands on the sidewalk opposite, while the manufacturer proceeds to the second or third story window, and holding the two bricks out against the wall, shows the committee, much to their surprise, that the contrast there is fully as great as in their own bricks. Still they are sceptical, and decide, against the advice of the manufacturer, and probably of the architect, to cull the bricks, taking the medium color for the front, and putting the extreme shades on the sides or rear. The consequence is that when the building is completed, pointed and cleaned down, it is found and admitted by all that the sides and rear, where the "culls" were used, are the handsomest parts of the whole. The above has been substantially the history of scores of buildings, and is only mentioned to show that the untrained eye cannot judge by the appearance of two bricks what the effect will be when seen *en masse*.

A very important point, however, in the use of varying shades of brick is that of having them evenly distributed in the wall. If either the light or dark shades are "bunched," the effect is very bad. Indeed it could not well be worse, and before this fact was fully appreciated, some buildings were erected which present a very unsightly appearance.

A splendid opportunity for the use of color with fine effect lies in the direction of pattern work for frieze, band course, or any plain surface. Right in this line were the illustrations in the issues of THE BRICKBUILDER for November and December, 1894. In the March issue also, in the article by Mr. Wyatt, on page 55, this idea is elaborated, and two exceedingly interesting cuts are displayed; one showing the chimneys of the Bryn Mawr School, and the other, a bit of the cornice and frieze of the Arundel apartments. I hope these will stimulate our architects to take up this very interesting and I am sure practical method of ornamentation of brick fronts at very little expense.

A good illustration of color effect in brick and terra-cotta is to be seen in the tower of the Mechanics' Building on Huntington Avenue.

With its dark red brick and light red terra-cotta, the effect is most pleasing. In the Art Museum, on Copley Square, is an illustration, perhaps, of the danger attending the use of several colors. The sharp contrasts there are not pleasing, and perhaps it is because of this danger that so few architects are seeking to produce the fine color effects which are possible with the bricks which are now in the market.

Perhaps the statement that our architects seem loath to branch out boldly into this field should be somewhat qualified. They seem now to be awakening to its possibilities. In New York City and Philadelphia especially there has been a great impetus given to the use of fire-flashed bricks and terra-cotta, and beautiful effects in old gold and mottled work have been attained. It may be interesting to note that in New York City are several old brick buildings which have been painted in imitation of varying colors of fire-flashed bricks.

But resort to the paint brush for color effects in brick is entirely out of place, and should not be tolerated. The natural colors now produced offer the widest field, and the next few years will doubtless show some interesting and beautiful color effects in the use of architectural clay products.

GEORGE M. FISKE.

BRICKBUILDER COMPETITIONS.

PROGRAM.

WE desire to announce a competition open to all draughtsmen who are subscribers to THE BRICKBUILDER, for a city house of brick. The house is to have a frontage of twenty-five feet on the street. The lot is eighty feet deep. The house will have four stories over the basement, and its cost must not exceed $16,000. The front will be of brick, with architectural detail of moulded pressed brick, taken from the catalogues of our advertisers, or of pressed brick and terra-cotta; colored faience may be introduced into the ornamentation if desired. The drawings will be made in line with black ink, on two sheets, cut to the uniform size of 14″ x 18″. One sheet will show the elevation at a scale of one fourth inch to the foot; the other, the plans of the first and second floors at a scale of one eighth inch to the foot; and details of the façade (especially the cornice) at a scale of one half inch to the foot. The style of brick bond adopted must be clearly shown on the elevation. Drawings must be received at the office of THE BRICKBUILDER not later than the first day of June. THE BRICKBUILDER offers a first prize of $60, a second prize of $40, and a third prize of $20. In addition to these prizes, THE BRICKBUILDER offers a special prize of $40 for that design, *accompanied by specifications*, for a similar brick house, of fireproof construction throughout, which can be executed at the lowest cost. In awarding this special prize, only those designs will be admitted to competition which reach a certain standard of excellence in design; but beyond that, the awarding of the prize will depend on the excellence and the economy of the construction called for in the specifications. Designs unaccompanied by specifications will be regarded as being entered only for competition for the first three prizes. This special prize may be taken by one of the winners of the other prizes, or by another, as the case may be. The question of cost will be submitted to an expert builder. The prizes will be awarded by a jury of three architects of acknowledged reputation.

Each drawing must be marked with a motto or cipher, and a sealed envelope similarly marked, containing the full name and address of the designer, must accompany the drawings. These envelopes will not be opened until after the award is made.

THE BRICKBUILDER reserves the right to publish the prize designs and the prize specification. Other drawings may be published with the permission of their authors. At the conclusion of the competition all drawings will be returned to competitors. Drawings must be delivered flat, express or postage prepaid.

OUR ILLUSTRATED ADVERTISEMENTS.

THE illustration in the advertisement of The Hydraulic Press Brick Company (see page xix) is a view of the church of Santa Fosca on the island of Torcello near Venice. Torcello was once one of the important towns of the Venetian lagoons. Now these buildings, standing alone among gardens and orchards, are all that remain of a city that was important before the present Venice existed.

The basilica was once the cathedral of Torcello. Both churches are even more interesting within than without, and the basilica contains some magnificent early mosaics. Both are of brick with marble columns used in the colonnades. They date from the eighth century of art era.

The Atwood Faience Company (see page xvii) illustrates this month one of the beautiful pieces of decorated faience by Luca della Robbia which forms part of the decoration of the chapel of the Pazzi family, a charming little building which stands close to the great church of Santa Croce in Florence.

A portion of the new street elevation of the Manhattan Life Insurance building is illustrated in the advertisement of the New York Architectural Terra-Cotta Company (see page xviii). The accompanying illustration of a decorative panel on a pilaster gives an idea of the elaborately designed and beautifully moulded terra-cotta detail.

THE annual loss by fire in the United States has become appalling. The debt entailed upon the country by the war of the Revolution was $75,000,000; by the war of 1812 the debt was $85,000,000. Yet at the present day the people of the United States are annually burning up every year more property than was consumed in either of these wars. And, since the close of the Rebellion, the aggregate loss by fire in the United States is larger than the whole amount of the expenditures made by the North to put down that gigantic rebellion. These are appalling figures, and they must lead to appalling conclusions.

THE TIFFANY PRESSED BRICK COMPANY announces a removal on the 1st of May to suite 1149–1151 new Marquette Building, where, besides showing their usual fine samples of plain and ornamental pressed brick, they can point to the entire "Marquette" court, which is faced to its sixteenth story with Tiffany enamelled brick. The Tiffany is retaining its trade in high-trade pressed brick, and is securing large contracts throughout the country for enamelled brick, which are being turned out in shapes and colors to suit the demands of archltects and owners.

THE GARRY IRON AND STEEL ROOFING COMPANY, of Cleveland, are just finishing the last iron building for the United Salt Company of Cleveland, Ohio.

Fireproofing Department.

Conducted in the Interests of Building Construction to Prevent Loss by Fire.

BUILDING CONSTRUCTION IN ITS RELATION TO FIRE PROTECTION.

(From the *Canadian Architect and Builder*.)

THE large fire which caused such destruction to buildings in one of the principal parts of Toronto last month made reasonably clear that the series of conflagrations by which Toronto has been visited of late were due to incendiarism. It can hardly be conceived, in the light of the immunity which the city enjoyed for so many years, that three such conflagrations should take place within so short a period from accidental causes. It has been the subject of comment that in each instance the fires originated in buildings situated in the very heart of the business district of the city, where there was a reasonable certainty of their being rebuilt. It is to be hoped that the reward of $1,000 offered by the Underwriters' Association for the conviction of the incendiaries will have the desired result.

The rapid destruction of Mr. Robert Simpson's new departmental store building, an illustration of which appeared in the January number of the *Canadian Architect and Builder*, and which was among the first of the buildings erected on the modern iron construction principle, not only demonstrated the insufficiency of the city's fire equipment, but what is more important, the fact, that so long as the prevailing methods of building are allowed to continue, the most effective fire-extinguishing appliances will be of little avail in preventing the spread of fire when once it shall have obtained hold upon a building. If a merchant wants a building put up with the greatest amount of floor space and with street fronts almost entirely of plate glass, his architect may advise him of the danger to which it will be exposed from fire, and that it will also be a menace to the safety of surrounding buildings; but if the proprietor refuse to go to the expense of making the building fireproof and be willing to assume the risk of having it destroyed, the architect can do no other than carry out his wishes. It is here that the law should step in and prevent the erection of structures of such a character. Since the recent fire, a clause has been discovered in the existing building by-law of the city, limiting the floor areas of buildings and providing other safeguards against fire. Strange to say, this clause has been more honored in the breach than in the observance. It reads as follows:—

"No block of warehouses or storehouses or other buildings (except churches, public halls, and opera houses) shall contain more than forty squares of building on the ground floor thereof, including internal and external, and half the party walls belonging thereto, unless such building be separated and divided by party walls into divisions of not more than forty squares of building as aforesaid, unless the permission of the city council shall be first obtained. No block of warehouses or other buildings shall communicate with any other block of warehouses or other buildings through a party wall, nor shall any stable communicate with any other stable through a party wall, unless the door case and sill of every such communication be of stone or wood covered with tin, and unless there be to every such communication a door of two thicknesses of wood covered on both sides with tin. No timber bond or lintel shall be laid into the brickwork of any wall in any such building nearer than eighteen inches to the opening of such communication, unless the door case and sill of every such communication be of stone or of wood cased with tin."

The committee appointed by the Ontario Association of Architects to recommend to the city council needed amendments to the city building by-law have lost no time in dealing with the subject. Since their appointment the committee have held eight meetings, at which the building ordinances of London, England, New York, Chicago, St. Louis, and a number of other cities have been carefully considered, together with other data bearing on the subject in hand. As the result of their deliberations the committee have framed a by-law which will be recommended to the city council at an early date. In view, however, of the unusual circumstances at present prevailing in the city, and the urgent necessity for immediate legislation to prevent the erection of buildings constructed in a manner similar to those recently destroyed, the committee have recommended that the following provisions be at once incorporated into the existing by-law:—

"FIREPROOF BUILDINGS.— Every building hereafter erected, which belongs to the public building class or the hotel class, the highest occupied floor of which exceeds 50 feet in height from the average ground line, and every building hereafter erected belonging to any other class, the highest occupied floor of which exceeds 70 feet in height from the average ground line, shall be built fireproof; that is to say:

"It shall be constructed with walls of brick, stone, or terra-cotta, or other hard, incombustible materials. No wooden beams, lintels, bond timber or wood strips shall be built in walls.

"The floors and roofs shall be constructed of brick or terra-cotta arches or other hard, incombustible material, and the supporting beams shall be of steel or iron, all properly cased with non-combustible material.

"The stairs and staircase landings shall be built of hard, incombustible materials.

"No woodwork or other inflammable material shall be used, excepting the floor boards, the doors and windows and their frames, and the trims, casings and interior finish, when filled solid at the back with fireproof material. The exposed parts of all constructional steel and iron work, supporting walls, floors, roof or stairs, shall be efficiently protected with at least two inches of porous terra-cotta; or, where such is not feasible, with wire lath and plastering of sufficient thickness.

"No existing non-fireproof building shall be converted to the purposes of a building of the public building or hotel classes, the highest occupied floor of which exceeds 50 feet from the average ground line, and no existing non-fireproof building shall be increased in height to exceed the limits set forth in this section for new buildings of the same class.

"But nothing in this section shall prevent the erection of what are known as grain elevators as usually constructed, provided they are erected on the water front in isolated localities, and under such conditions as the inspector of buildings may deem prudent.

"ELEVATORS. — Where elevators are enclosed in shafts, all the enclosing walls must be built of brick or terra-cotta or other incombustible material.

"In all buildings of the manufactory class that are more than two stories in height above basement, and in all buildings of the store and warehouse class that are more than three stories in height above basement, the elevators must be enclosed in shafts built of brick or terra-cotta, and extending at least three feet above roof, and covered with a light glass skylight or easily broken covering; and all the doorways opening into such shafts shall be closed by iron doors, or else by doors of two thicknesses of solid boards covered all over with asbestos and sheet metal.

"Where elevator shafts cannot conveniently run to top story and from thence out to roof, the top of shaft must be covered with a fireproof ceiling.

"Where elevators are open, the guide posts and corner posts must be of iron, and any inclosing screens must be of incombustible material. No woodwork of any kind, other than strips on cage guide posts, shall be carried from floor to floor.

"FLOOR AREA. — No building hereafter erected (except public audience rooms) shall have on any floor thereof more than four thousand square feet of floor area undivided by division walls. Nor shall the undivided floor area of any floor in any existing building (except

public audience rooms) be increased so as to contain more than four thousand square feet.

"Division walls to divide the floor area of a building into spaces of not more than four thousand square feet must be of stone, brick, or terra-cotta.

"Door or other openings through division walls must not exceed in their united width one third the length of wall.

"All openings through division or party walls shall have tight-fitting doors and frames of iron; or else, if of wood, constructed of two thicknesses of solid boards, and covered with asbestos and sheet metal.

"Each section of floor area divided from the rest of building by division walls and fire-resisting doors shall have a separate stair and exit to street.

"All fireproof buildings, built as described for fireproof buildings under section . . . of this by-law, shall be exempt from the restrictions as to floor area.

"PROTECTING STRUCTURAL IRON WORK. — All metal columns and beams supporting walls, except first floor and basement columns on street fronts, shall be efficiently protected by non-combustible materials."

There is a misconception on the part of the public as to what constitutes a fireproof building. The opinion is held that buildings such as the Simpson and McKinnon buildings recently destroyed, constructed with iron supports, were intented to be fireproof. This is altogether an error. It was perfectly well understood by the architects of these buildings that the safety of these structures was in no way enhanced, but rather endangered, by the use of an unprotected iron framework. The advantage sought to be gained by the use of this method of construction was rather in the direction of securing larger floor and light areas. As was pointed out in an article on this subject in the *Canadain Architect and Builder* for January, iron should not be used for the support of a building unless covered with fireproof material, such as porous terra-cotta, and it is hoped that the proposed new building ordinance of the city will render this imperative.

A provision which would to a considerable extent enhance the safety of buildings from injury by fire originating on adjoining premises, would be one which would compel the owners of business buildings to protect with iron shutters the windows in the rear walls abutting on adjoining property. Two of the greatest sources of danger are windows and elevator shafts. The windows are broken by the heat, thus setting in motion currents of air by which the flames from burning buildings adjoining are sucked in through the openings, carrying with them destruction to the interior of the building. It is too much to require owners of office and other business buildings to disfigure them by placing iron shutters on the windows of the principal street elevations, but no such objection could be urged as regards the protection of windows on rear walls.

Yet another valuable protection, to our mind, would be movable iron floors in elevator shafts, which should be employed at night to shut off each flat of the building. One of the recommendations of the committee of the O. A. A. is, that such shafts should be lined with fireproof material, and should have fireproof doors at the entrances on each flat; that the shaft should extend three feet above the roof and be covered with glass, which would be easily broken by heat. This provision is a wise one as far as it goes, its object being to confine the fire to the shaft and prevent its spread laterally throughout the building. There is danger, however, that combustible material would be carried through the top of the shaft to the roof of the building and to buildings adjoining. Such a provision as we have mentioned would act as a more complete safeguard, tending to prevent the fire from extending beyond a single flat, where, thus confined, it could effectually be dealt with by the firemen.

Some attention should be given to the construction of floors in a manner that would offer greater resistance to fire. The plastering of ceilings is quite a protection to the under side of the floor, and if floors were lined with asbestos or laid in mortar, a much longer time would be required for them to burn out.

THE MODERN OFFICE BUILDING.

WITHIN the past decade the demands of business have caused such a general change in the class of buildings erected for office purposes, that the architect of the present day is either primarily an engineer or closely allied with those of the engineering profession. The office building of the past was generally a four or five story structure, non-fireproof, poorly lighted and ventilated, and built on the most economical of lines. No particular attention was paid to the comfort of the tenants, well-designed lavatories and elevators were unthought of, and, in fact, the building was simply a series of lofts divided into compartments, poorly finished and badly designed generally.

Twenty years ago a stranger crossing the North River was impressed by the sight of the beautiful spire of Trinity Church, which rose high above the tops of the down-town buildings. As far as the eye could reach there was a level sky line, broken here and there by a few chimneys and steeples. How different the sky line of to-day! Enormous structures, some of which are over two hundred feet in height, with their great weights, would seem almost to crush the narrow section of land on which they stand and bury it beneath the waters of the rivers which flow on either side of the city.

Property in the business sections of New York City has advanced so rapidly in valuation that the rentals of an office building of less than eight or ten stories in height will not pay an interest on the investment. The gradual growth and the recent development of large business enterprises controlled by wealthy corporations, has created a demand for larger and better equipped quarters in which to carry on the business of the corporations. The resultant is the magnificent pile of steel, brick and stone which rises many stories above the sidewalk. The palaces of kings are not more elegantly fitted up and furnished than are the business homes of many of the large corporations. The president has his private office and his reception-room; the directors, their board and dining rooms; the minor officers in turn each his own private office; and the main offices are large, with high ceilings, and most comfortably furnished. The offices are usually trimmed in the most expensive of hard woods, either mahogany or quartered oak, beautifully panelled, moulded, and richly carved; floors are the most handsome of parquetry; railings and hardware of bronze, cast and cut in the most unique of designs; heavily moulded ceilings and cornices are modelled from the best of materials. The offices usually take up the main floors of the building, and the remaining stories, less elegantly finished, as a matter of course, are divided into office floors to suit the convenienee of the tenant; and it is a well-known fact that this class of building rarely has a vacant office. Lavatories, usually on all floors, are large, well lighted, and ventilated. Floors, trim and wainscot are of marble, and the plumbing fixtures are of the most approved make. Elevator service is rapid and regular, the building is heated by steam and lighted with electricity and gas. Each individual main office has a basin with a plentiful supply of water, and towels and ice are furnished to tenants at a very small cost. This is, in general, the type of building that is gradually replacing the old structures. The corporation has set the pace, and the individual owner must needs follow suit or his building will soon be tenantless.

All large modern office buildings resemble one another in general plan and detail, but each in turn must necessarily be an improvement on the one preceding, in order that it may be a paying institution. From the foundation up, every detail must be most carefully studied, and it is the wise man who profits by the mistakes of those who have designed before him. The question of light and air is of primal importance. A building well designed is well lighted by the light of day, and has large wide courts, thin court walls, and sufficient glass surface. It is a mistake to line the court walls with common brick; a pale buff face brick will diffuse the light and more than pay for its use. It is from this court that all interior offices are lighted and ventilated, and practice teaches the architect to sacrifice floor space in planning his building, and lay out, as it were, his floor plan around a court of suitable area.

The subsoil in lower Manhattan Island is a good strong sandy loam, with layers of quick and running sand seldom more than a foot or two in depth. Beneath this the rock is found at varying depths anywhere from sixty to one hundred feet below the surface. Two large buildings were carried down to rock on masonry piers at great expense, one other is carried on wooden pile foundations, and a third method, one in general use in Chicago, that of using a grillage of steel beams and girders, is now about to be employed to carry a building in which the weights will exceed those of any building that has as yet been erected in New York City. The safe bearing capacity of the sub-foundation varies from one and one half tons per square foot to four tons per square foot. Upon the earth bottom, after it has been well levelled off in the case of the last-named building, a layer of one foot in thickness of concrete composed of one part best American Portland cement, two parts clean sharp sand, and four parts small broken stone is put down, carefully rammed and levelled off to receive a layer of steel beams, which are placed one foot apart on centres and well filled between with concrete. This concrete is levelled off one half inch above the top of this layer of beams, in order to receive the next layer, which acts as the footings for piers and columns.

As a general thing the most accepted method of construction is on the "skeleton plan," with columns, and girders carrying thin curtain walls. Steel work is preferred for columns, on account of greater strength and rigidity of connections. Brick is usually of Haverstraw or best North or up-river manufacture, and all exposed walls are laid up in Portland cement mortar. Rosendale cement is most commonly used, but experience shows the architect that on account of the thinness of the walls, the probability of dampness is greatly reduced by the use of Portland cements. All exterior walls are furred with two-inch furring blocks securely nailed up, and on this furring are plastered two coats of rock plaster. Exposed columns, girders, and in fact all structural steel and iron work are usually furred with from two-inch to four-inch hard-burned terra-cotta blocks laid up in cement mortar. There are two methods of flooring in use in this city. The first, and one most generally used, is a flooring of hollow terra-cotta blocks usually ten inches in depth, over which is laid a filling of steam ashes and cement to a height of about three inches above the top of the steel beams, and in this filling are bedded the three-inch by four-inch wooden sleepers to which the top flooring is nailed. A floor of this description was used in the Rhinelander Building in this city. The blocks were twelve inches deep, and plastered on under side with one-inch Portland cement mortar. One of the upper stories was recently entirely burned out. Furniture and fixtures to the value of several thousand dollars on this floor were entirely destroyed, and yet the actual damage to the building itself was less than eight hundred dollars. The wooden floors were charred through to the concrete beneath. The entire story was deluged with water, but the arches above and below were not damaged in the least, and in fact, except for a slight amount of damage from water, the tenant immediately beneath was able to carry on his business without interruption.

The second method, which has recently come into use, is that of stringing wires from beam to beam and filling in a thickness of three or four inches with a mixture of plaster Paris and wood pulp. The ceiling is hung to the beams and filled with the same material so as to leave an air space between the upper and lower layers. Tests of these floors have been very satisfactory. They are absolutely fireproof, exceedingly strong, and fully sixty per cent lighter than a flooring of hollow blocks.

J. Hollis Wells,
Civil Engineer.

(*To be continued.*)

At the request of the Buffalo Chapter of Architects and the Builders' Exchange, the Builders' Exchange Association have decided to open a permanent exhibit of builders' supplies and material. The *Intending Builder* of Rochester has been indorsed as the official organ of the Exchange, and will remove their offices to Buffalo.

Mortars and Concrete Department.

Devoted to Advanced Methods of using Cements and Limes in Building Construction.

AMERICAN CEMENT.

III. — *Continued.*

In 1869 the manufacture of natural rock cement was established at La Salle, Ill., on the line of the same cement rock formation running through Utica, Ill., and has since been in continuous and successful operation.

In 1870 a cement works was established at Howe's Cave, N. Y., and has been operated continuously since then, producing a cement of uniformly good quality, which has been used successfully in many very important public buildings and heavy masonry.

In 1874 the Buffalo Cement Company commenced the manufacture of natural rock cement at Buffalo, N. Y., and owing to the excellent quality of the cement rock, the manufactured product rapidly advanced in public favor.

In 1877 the works were rebuilt on a large scale, and the capacity greatly increased. With almost unequalled facilities for transportation, this company has been very successful, and now enjoys a large and increasing trade.

In 1875 the Milwaukee Cement Company entered upon the manufacture of natural rock cement near Milwaukee, Wis. The success of this company has been phenomenal. With rock of a uniform and reliable character, and with works equal, if not superior, to any in the country, and with splendid transportation facilities, this cement has gained an enviable position in the markets of the West.

In 1883 a large plant for the manufacture of natural rock cement was established at Mankato, Minn. The works are of stone, and present a fine and substantial appearance. The cement rock is of the very best quality, and the manufactured product has obtained a strong foothold in the markets of the Northwest. Mortar made from this cement becomes exceedingly hard and stone-like in character, whether above or below water, and withstands to a remarkable degree the disintegrating effects of alternate freezing and thawing.

In closing this brief and incomplete *résumé* of the rock cement industry in this and foreign lands, it may be well to emphasize the fact that in no other country of the world is there to be found cement rock formations which are at all to be compared with those so well distributed throughout the United States.

The principal source of rock cements in England is from the Liassic or upper and lower Blue Lias subdivision of the Jurassic rock formation, extending from Lyme Regis on the south coast in a northerly direction to Yorkshire on the north, and averaging some thirty miles in width.

From the Memoirs of the geological survey of the Jurassic rocks of Britain, and more especially the report on the Lias of England and Wales, by Horace B. Woodward, London, 1893, we glean certain facts regarding bed formations and the source of the Roman or rock cement supply in that country since the days of Parker to the present time, from which we can readily understand why the artificial production of cement was resorted to.

The Lower Lias, from which the rock cements are obtained, consists in its lower portion of layers of blue and gray limestones, more or less argillaceous. These layers occur sometimes in even and sometimes in irregular bands, often nodular and interrupted, and they alternate with blue and brown marls, clays, and shales. Nowhere in the Lower Lias is there any marked band of rock which can be traced continuously for any great distance. The higher portion of the Lower Lias consists of blue, more or less micaceous clays, shales, and marls, with occasional septaria nodules and bands of earthy and shelly lime-

stones and sandy layers. There is no rigid plane of demarcation between them and the mass of limestones beneath, while the clays pass upward into the lower beds of the Middle Lias with no lithological break or divisional line.

There is no layer of the rock used for cement purposes which does not vary in its proportion of clay, ofttimes as much as twenty per cent in individual quarries; and we find that whereas one layer may contain eight per cent, the one next above or below may contain fifty per cent of clay.

Clearly it is not remarkable that a cement made from such an ill-assorted mass of material should lack uniformity. No rational man in America would dream of undertaking to produce a rock cement from such a jumble of clays, shales, marls, nodules, limestones, and cement stones. Is it then to be wondered at that artificial mixtures were employed in an endeavor to meet and overcome the dissatisfaction unavoidably growing out of the use of such natural rock cements?

Contrast these materials with our own massive cement rock deposits! Here we have immense beds of cement rock absolutely free from any extraneous substances, perfectly pure and clean, with layer upon layer, extending for thousands of feet, without the appreciable variation in the proportion of ingredients.

Cement rock quarries are worked in this country decade after decade without the necessity of discarding a pound of the material, and analyses taken during successive years show no changes whatever in the constituent parts. Had England possessed such cement rock formations as are distributed throughout this country, it is extremely doubtful if the production of artificial cement would have been resorted to. Under such circumstances there would have been no occasion for it.

The magnitude and value of the work done with the rock cements of this country is almost beyond comprehension. They have been used in the largest buildings, tunnels, bridges, dams, and aqueducts constructed in America, and a failure has yet to be reported and recorded. More than seventy-seven million barrels have been so used during the past twelve years.

In subsequent chapters the various rock cement deposits of this country will be discussed in detail, with descriptions of the various plants, together with a mention of the important works executed with the various brands, the magnitude and permanence of which should set at rest all question and all doubts concerning the enduring qualities of American rock cements.

URIAH CUMMINGS.

(*To be continued.*)

LOS ANGELES, CAL., March 15, 1895.

EDITOR OF THE BRICKBUILDER.

Dear Sir, — I have read in your valuable publication with great pleasure several very interesting articles on Portland cement, and am not only thoroughly familiar with the manufacture of this valuable building material in America, Germany, England, and France, but likewise as cement contractor and specialist am daily using large quantities, and by continued practical use and theoretical knowledge obtained by years of study combined have become intimately acquainted with the qualities of the different products and brands. With the following for the benefit of the new industry in this country, where Portland cement is coming daily in more extensive use and where so little of a proper quality is as yet manufactured, I will preface the article with

WHAT IS PORTLAND CEMENT?

Portland cement is a product obtained by burning a close mixture of materials containing lime and clay to a high degree of heat 3000° to 3500° Fahr., then grinding to flour fineness. Since the product so obtained in color as well as in crushing strength resembled the Portland stone, Joseph Aspdin of England, the discoverer of the cement in the year 1824, gave it the name of Portland cement; notwithstanding that Portland cement cannot be produced from the Portland stone.

Portland cement can be manufactured anywhere where limestone and clay containing the requisite ingredients can be obtained at a reasonable price, but very seldom do we find cement rock deposits containing lime and clay in the right proportion required for Portland cement. The product of the various factories differs so very materially that it becomes absolutely necessary in the erection of larger buildings and complicated cement constructions to test the tensile and crushing strength of the cements to be used therein, and to continue these tests at intervals, even if the same brand is used on the same work. I always prefer that cement which exhibits the greatest tensile strength, and above all the greatest uniformity and fineness; but these qualities are the great desideratum with our American cements, which I have used extensively, and invariably found the lack of continued uniformity and tensile strength. For a time they will be equal to the best imported, and all at once the same factory will bring an article into the market with hardly any tensile strength, far below the average, or which sets too fast or not at all; and on this point I must coincide with the remarks of Mr. R. F. Tucker, when he says, "The Portland cements of American manufacture have a long road to travel before reaching the standard of excellence achieved by our rivals across the water."

I have found during many years of practice that the most uniform cement is the German, and especially the celebrated Dyckerhoff, also the Heidelberg, Alsen, Germania, and the Mannheimer brands.

Mr. Hartranft combats the article of Mr. Tucker and mentions (with justice I admit) the extensive plant of the Copley Manufacturing Company, which I consider the largest Portland cement factory in the United States, but which stands no comparison with the German factories above mentioned.

If Mr. Hartranft would visit these factories he would find, first, the most perfect and complete chemical laboratories, the most economic use of fuels, utilization of space, and above all the conscientious management of the entire factory, based upon scientific investigations and theoretical and practical knowledge, and would also find in these factories a perfect absence of the annoying and dangerous cement dust.

The raw material used in the Copley factory is a superior article, as good as can be found anywhere. The deposit is in close proximity to the plant. Its chemical ingredients are such that by direct burning from the deposit it will produce a good hydraulic cement.

The Portland cement from this factory is as good as any manufactured in America.

The lately erected factories in Germany are all handsomely designed brick structures, and as to the arrangement of light, ventilation, and proper working facilities the greatest care has been exercised in their construction. The kilns are continuous; and the thorough burnt klinkers after cooling are carefully separated from those that are not perfectly burnt; the latter are burnt over again, a process which is not so closely adhered to in the manufacture of our American cements, but which is one of the points so essential to the production of a uniform cement.

Another good point in favor of the German cement manufacturers, which greatly assists the cement industry in that country, is the existence of a German Cement Manufacturers Association (Cement Verein), which a great many cement manufacturers from other countries have joined. The most prominent cement engineers and chemists are active members of it. The association convenes twice a year, to fully discuss the cement industry and adopt such measures as are required by the exigencies of the times to mutually protect it.

New inventions or improvements in machinery, kilns, etc., are laid before the meetings, and all questions of interest discussed, and much knowledge is thus disseminated; but above all do they pay particular attention from a scientific and practical point to the norms of cement for the benefit of the industry at large.

These meetings and discussions have, no doubt, in a great measure tended to give to the German cement manufacturers the very best and most improved methods of manufacture, and placed them in the front rank, leading all other countries in the production of quan-

tity as well as quality. Their example has induced manufacturers in other countries to proceed in like manner, and to adopt some, though with slight change, the norms of the German manufacturers. Since the established norms form the rules for the factory, they act as a spur to correctness for themselves, and force to further perfection of the manufactured article, which will not only be beneficial to the public at large, but it will tend to elevate our industry, and bring our cements in time to that standard of excellence which will make us independent of foreign importation.

I regret to state that even our most prominent engineers seldom test the cement they are using in the right manner, but test it in its pure state, which is a mistake, as cement is never used in its pure state, but is invariably mixed with sand, and that cement which with a certain tensile strength takes up the most sand is certainly the best and cheapest.

It is surprising, yet true, that the good coarse-ground Portland cement, in its pure state, will show greater tensile strength than the same article finely ground.

I think that the time has arrived when our Portland cement manufacturers should induce the government to establish national testing offices, where all brands that come into the market will be scientifically and impartially tested, and where, with the assistance of the cement manufacturers, a uniform testing method will be adopted and adhered to, and standard norms established.

The manufacturer would then strive to work his product up to these norms and to uniformity, and it would be to his interest to see that no cement leaves his factory which does not come up to the norms adopted, and is of uniform quality.

C. LEONARDT.

VARIOUS SYSTEMS OF CONCRETE CONSTRUCTION.

(*Continued from March number.*)

CONCRETE AND TWISTED STEEL.

THE use of the twisted steel bar to impart tensile strength to concrete is one of the most important discoveries ever made in this branch of construction. The use of the plain rod is obviously objectionable, for the reason that the hold of the cement on the iron is merely one of adhesion, and the limit of strength imparted to the concrete is the amount of adhesion of the two materials. This is a small quantity, but it is obviously increased by putting large washers and nuts on the ends of the rods. Naturally this is expensive and bothersome, and the loads are transferred largely to the ends of the rods, instead of being distributed uniformly along the bar. The use of the twisted rod therefore is apparent. A bar of square iron or steel is twisted cold. This forms a series of spiral grooves about the bar along its whole length. The iron being carefully imbedded, the concrete finds its way into the grooves and holds the bar at every point, so that it is necessary for it to shear the concrete at every point from one end of the bar to the other, in order to separate the cement from the steel. This is impossible within the working strength of the two materials. The bar is easily and quickly twisted, and the whole strength of the iron is imparted immediately to the concrete. The use of smooth and the twisted bar is analogous to the use of the nail and the screw in woodwork.

The basis then of this system of construction, which was invented by Ernest L. Ransome of San Francisco, "is the method of introducing iron with concrete in such a manner as to give to the concrete beam or girder the power to resist tensile stresses as if the beam were of a fibrous or homogeneous material, like iron or wood. In such a construction it is essential, first, that the iron and the concrete be so united as to enable each to act immediately with the other in resisting stresses; second, that the bond between the two should be continuous and equal from one end of the beam to the other; third, that the elastic limit of elongations of the two should be made as nearly equal as possible. These requisites are all practically simply and quickly met by imbedding in the tensile area of the concrete beam a square bar of cold twisted iron."

"This system of concrete and twisted iron construction is, by reason of its great strength, durability, its lightness, its fire-resisting qualities, and withal the economy in its use, of almost universal application in concrete, and is designed to cover the entire field of iron, stone, brick, and terra-cotta construction, including the laying of heavy foundations and piers, the construction of monolithic buildings for all purposes, of concrete beams and girders for all spans and loads, and of monolithic fireproof floors in place of heavier and more expensive methods."

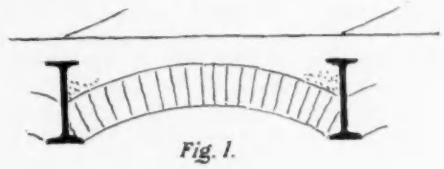


Fig. 1.

One of the first methods of using concrete in floor construction was merely as a filling over brick arches (Fig. 1), and this system, uneconomical and obsolete as it is, is still in use.

The next step was to do away with the brick arch and use the concrete for distributing the load on to the bearers (Fig. 2). A finished surface being made, this formed a very good floor, the only defect arising from the cracking of the floor along the bearer, in cases of overloading. This is especially objectionable in malt-house

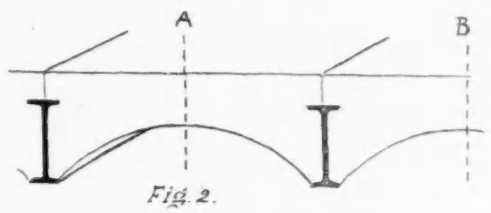


Fig. 2.

floors and in other places where there is much dampness and danger from germs and other growths. The cracking of these floors is largely obviated by a device shown below, in which the concrete over the beams is cored out between two joints, and after the main body has set, the core is filled in and finished (Fig. 3). The deflection of the beam may thus be taken up without danger of cracking the surface. This has been used largely by Mr. Ransome in various important works.

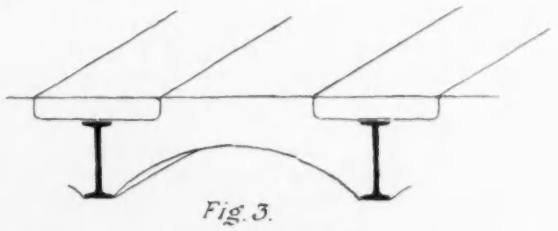


Fig. 3.

The concrete for such arches should be composed of one part high-grade Portland cement, two parts sand, six parts broken stone, all thoroughly mixed and wet to the consistency of a stiff dough. The top should be composed of one part cement to two parts coarse sand, put on immediately after the bottom is in and trowelled down to a hard surface and carefully jointed.

It will be seen from a study of Fig. 2 that considering the portion between A B to act as a beam independently of adjoining sections, that there is obviously a waste of both iron and concrete for the strength required; that the section of concrete is not in proportion to the section of steel; that a portion of the section of steel is in the compressive area of the beam, and that the remaining section is not suitably placed for imparting its strength to the concrete. In other words, we may do away entirely with the upper section of the steel beam, and simply taking the amount of material in the lower section,

The Mason Contractors' Department.

Conducted in the Interests of the Builder and the Contractor for Brickwork.

"SIDE TALKS WITH THE BUILDERS."

AFTER one of the most severe winters in the history of our country, springtime is at hand, and with it comes the customary rumors of gigantic building projects, of which fully one half generally prove mere fizzles, products of the imagination of some aspiring reporter.

Many contractors, and especially the younger ones, are apt to be far too eager to secure work at the opening of the season, taking contracts at little or no profit, just for the sake of getting the work, oftentimes loading themselves up with these contracts for the entire season at poor prices, with small profit; while the older and more experienced builder, if not able to secure a fair price, will content himself with jobbing till midsummer, when his near-sighted and more eager brethren, loaded with all the work they can manage, are unable to figure on more work, and thus enable the shrewd man to take contracts with profit.

Far less would be the number of failures among mason builders, and in fact among contractors in general, if they would profit by the experience which others have paid dearly for; in other words, "be more cautious and less ambitious." No doubt ambition is a virtue in some cases, but in the case of young mason contractors especially it generally proves fatal. Better by far go into the fields and gather Mayflowers or listen to the song of the bluebirds, than be doing work that you know will not profit you enough to buy a suit of cast-off clothing, and will certainly gain you no reputation.

The public as a rule puts more confidence in the man who figures to make a dollar, believing that he can afford to do good work; while the man who takes work with no chance of profit is very likely to slight the job in order to get out whole.

The proportion of chimney flues is a question that most masons are not well acquainted with. The old rule concerning chimneys was to the effect that the flue should be tapered to the top, on the theory that as the hot gases pass upward they become cooled, and in the process of cooling they become contracted; also that it was important to reduce the size of the flue in proportion to the reduction in volume of the gases, as otherwise cold air from the top would descend and fill the vacancy caused by the contraction of the gases, and in this way the draft would be checked. Reasonable as this theory seems, practice has shown that cylindrical boiler or furnace flues are at least as good as the tapered ones, and within a few years engineers and architects of experience in such matters have shown a disposition to make them slightly larger at the top than at the bottom, the increase of diameter being, perhaps, one half inch to ten or twelve feet.

Not long since a Swiss engineer made experiments to see whether the facts bear out the old rule or support the modern practice. To make the test he built a chimney over a furnace grate, the stack having two flues. One flue tapered upward and the other downward, and the flues opened side by side over the grate, with openings of the same size.

On lighting a fire on the grate with unlimited access of air under it, the smoke was seen to issue nearly equally from the top of both the flues, but with an unmistakable preponderance in favor of the flue which enlarged toward the top. On partially shutting off the access of air to the flue, the difference became much more marked; the current in the flue tapering upward diminished, and finally stopped altogether, the smoke finding its way entirely through the flue with the *wider top*.

The importance of selecting proper brick for constructing buildings is so evident that it needs but the statement of the fact, without argument, to have it generally accepted.

It is plain that in the construction of buildings care ought to be taken to have them of such architectural design as to present an agreeable impression to the eye; but as they are intended for the future as well as for the present, they should be of such materials as to withstand the ravages of time.

Even a limited examination of edifices, public and private, discloses the fact that brick of the same general character vary greatly in serving the same purpose. While some preserve their soundness after years of exposure, others quickly show signs of decay and rapidly crumble, requiring continuous repairs to keep them in proper condition. In some buildings cracks and fissures appear in them, the material not being in all cases of sufficient strength to resist the pressure. In other buildings a similar variety of brick, though subject to equal or greater pressure, remains unimpared. The value of building brick, therefore, may be briefly expessed as depending upon two causes: first, physical constitution; second, their chemical composition.

The most important in its results of all experiments regarding brick is the determination of the force required to crush them, and the importance of determining the resistance of building material to pressure cannot well be overestimated. It gives accurate information obtainable in no other way.

The crushing strength of bricks of course varies greatly. A rather soft one will crush under from 450 to 600 pounds per square inch, while a first-rate machine-pressed brick will require about 6,222 pounds per square inch. This last is about the crushing limits of the best sandstones, two thirds as much as limestones and marbles, and about one half as much as granite or roofing slate. But masses of brickwork crush under much smaller loads than single bricks. It must be remembered, however, that cracking and splitting usually commence under about one half their crushing loads. To be safe the load should not exceed one eighth to one tenth the crushing limit.

The approach of May 1 reminds me that this day of all others is generally the one selected for the inauguration of great labor strikes. This year, however, the indications are, among building trades at least, that the day will pass without any serious rupture.

The logical conclusion from the present position of building trades must be that the members of unions recognize the value of intelligent rather than hot-headed leadership. Master masons, as a rule, are seldom disposed to discourage unions, but frequently have occasion to criticise the senseless and unfortunate methods adopted. One trouble with trade unionism as practised, as far as known the world over, is that it attempts to create a close monopolistic corporation. It is the same principle at the other end of the line that actuates the great corporations known as "trusts," which every "reform" politician is just now crying down. It is the same feeling which on the part of the union cuts down the number of apprentices, and interferes with boys learning trades, that actuates the trusts that attempt to control all the salt works, or all the sugar refineries, or any other great commodity, and both ultimately, when acting on these principles, end in disaster.

Builders have had frequent occasions to lament the lack of good mechanics and skilled artisans. To a certain extent every union could be a school of its trade, and thus render a substantial benefit, not alone to its members, but to the community at large, by raising the standard of workmanship, and thus make employers pride themselves on employing union men. Unions, too, could adopt some system of gradation, according to the ability, and not grade all with the poorest as at present.

Trade unionism will reach its greatest success when it learns to become an organization of progress, and bases its claims for employment on the mechanical ability of its members. I do not say that conflicts arising from greed on either side will be entirely avoided; but as the value of union men as against others comes to be appreciated, there will be greater efforts made to adjust differences, and under

convert it into bars, and imbed it in the concrete in the manner shown in Fig. 4.

This then is the first step in doing away with the steel beam, the section of the concrete remaining practically as in Fig. 2.

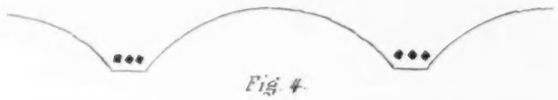


Fig. 4.

This section of floor was used some seven or eight years ago in Bowen's wine cellar in St. Helena, California (Fig. 5). The architect,[1] in a recent paper, says: "This building is four hundred feet long, seventy-five feet wide, and three stories high. The entire site is cut into the side of a gently sloping hill along the entire length of the rear, and at the levels of both first and second floors, while

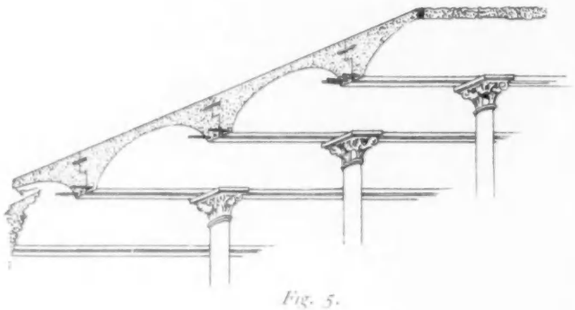


Fig. 5.

beyond the driveways and retaining walls are thirteen tunnels, sixteen feet wide, penetrating the hill about two hundred feet. On the site of the building, and immediately surrounding it, were an abundance of bowlders, of very hard basaltic stone, quite unsuitable for rubble stonework, owing to their rounding form, but excellent material for concrete when crushed; the finer materials were obtained in the form of gravel from a neighboring creek. A good quarry of the soft but durable volcanic tufa, so common in Napa Valley, was found within half a mile of the building, and as it could be quarried, hauled, and built into the walls for seventeen cents per cubic foot, it was employed for all walls and partitions of the building. The foundations, retaining walls, lining of tunnel entrances, and main floor laid on the ground were formed of concrete in the usual manner. The entire second floor, together with the driveway at the level, was constructed with concrete and twisted iron rods in the form of beams and elliptical arches, as shown in Fig. 5, and as here described. Two rows of iron columns seven feet four inches on the centre were placed lengthwise of the building, dividing the width into three sections of about twenty-five feet each. The floor was constructed with concrete beams seven feet four inches on centres passing entirely across the building, with their soffits resting on the iron columns. The beams were twenty-four inches deep from soffit to surface of floor, and each had four 1¼" x 1¼" twisted iron rods near the bottom, with a vertical joint along the centre of each beam, protected against leaking by a strip of lead imbedded in each half of the beam. The arches between the beams were elliptical in form, and the concrete five inches thick at crown of arches.

"This floor was estimated and intended to carry with safety on each beam, for each twenty-five foot section, two casks, each containing two thousand gallons of wine, or a total weight, including cooperage, of forty thousand pounds, on each section 7′ 4″ x 25′, or about two hundred and twenty pounds per square foot, uniformly distributed. The arrangement of the casks was intended to leave a gangway eight feet wide in the centre of each section, thus giving less stress than a uniformly distributed load.

"Before the building was finished one of these sections was tested with a uniformly distributed load of three hundred pounds to a square foot, and produced a deflection of one eighth of an inch at the centre; on removing the load the beam returned to very nearly its original position. Since the building has been occupied many of the gangways have had tiers of large casks placed two in height along the entire length, and smaller casks set between the upper bilges of the large casks, thus loading the floor largely in excess of its intended capacity. Implicit faith seems to be placed in this construction, by those engaged about it, that it will carry anything that can be put on it. These floors have now been in use four or five years, and answer the purpose for which they were designed by making a strong and non-absorbing floor, and assisting in keeping a uniform temperature throughout the building."

These facts illustrate perfectly the value of the principle involved, that of allowing concrete to do its work in compression, while the steel does its work in tension. A still further study of the section shows that economy and strength are to be gained by cutting out a part of the concrete in the haunch of the arch, by deepening the beam, using a single bar, and bringing the beams a little nearer to one another, as in Fig. 6.

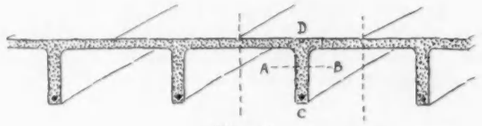


Fig. 6.

This section presents a typical form of Ransome floor, and one which has been used continuously in a number of cities for many years. It is extremely light, strong, water and fire proof, and especially adapted to breweries, packing houses, and other buildings of that nature.

The theory upon which these beams are constructed may be briefly described as follows. It is well known that the ratio of the strengths of concrete and iron is about one to forty; in other words that concrete in compression has about one fortieth the strength of iron in tension, using twenty tons per square foot as the safe strength of concrete, and about ten thousand pounds to the square inch as the safe strength of iron. Therefore in designing a concrete beam we assume a T section (Fig. 6), supposing the neutral axis to be about at A B. Supposing the beam to be supported and loaded in the ordinary way, the section below A B is in tension, the stress increasing as the distance from A B increases, being greatest at the bottom C. Similarly the section above A B is in compression, the stress being greatest at the top D.

Therefore the greater part of the concrete should be assembled as near as possible to the top D, say within the upper third of the distance from A B, in order to be most effective in resisting compression.

In designing such a beam, it is first necessary to determine the amount of fibre stress developed at C, due to a given load, the beam being of a given span. The depth of the beam is assumed for the moment. A bar of iron of a section sufficient to withstand the strain thus determined is imbedded as low as possible within the tensile area. Then we make the area of concrete within the upper third at least forty times the section of iron used in the bottom. We now have a section which for the given span and load is sufficient both for resisting tension and for resisting compression. The materials used are doing their own work, in a way best suited for them to do it. In a subsequent paper more will be said upon the adaptation of this principle in floors and girder work, and some illustrations of work already done will be given.

ROSS F. TUCKER.

[1] G. W. Percy, Proceedings of S. F. Chapter, A. I. A.

THE MANUFACTURER.

CORRESPONDENTS' LETTERS.

PHILADELPHIA opens this spring with not a little activity in the building circles. Contractors are looking for a boom, which they feel assured will materialize in the near future. The bulk of the operations commenced thus far are residences, and some of them are quite extensive, but there are well-founded rumors of large office buildings, hotels, places of amusement, and public buildings.

Yet all this pleasing prospect may be sadly marred within the next few days, if the associations of masters and journeymen bricklayers will be unable to agree upon a scale of wages for the current year. The difficulty seems to be a question of wages: the journeymen claiming forty-five cents an hour, and the masters asserting that forty cents will be sufficient for the current year. It appears that the journeymen received forty-five cents last year by reason of some misunderstanding, and that rather than have a strike at that time the masters acquiesced; but they now desire to restore the former rate of forty cents, and thereby regain the position they claim to have lost through some technicality or misunderstanding. It is to be hoped that proper discretion will be used upon both sides, and a strike, which would mean a stagnation in all the building transactions now in progress and prospect, and blight of a seemingly busy and prosperous year will be avoided.

Architects are busy pondering over the programme for a competition for designs for an Art Museum, which is to be built in Fairmount Park; and those who are seriously thinking of entering are endeavoring to find out, if possible, where they shall commence, or what they shall make in the matter of drawings. The programme is most peculiar in that it does not say what drawings shall be made, at what scale they shall be, how they shall be rendered, nor is the probable location of the building given, a plot of the grounds being referred to, which, I understand, is not now in shape to be given to intending competitors. It would seem that the programme should have a thorough revision by some one who understands the conduct of competitions of this kind; but here seemingly is the place where the error has been made. It appears as though the commissioners do not want it to go forth as a full-fledged architectural competition, but rather as a competition for designs and ideas, which shall afterward be compiled and used by an appointed or selected architect, and made use of in the final plans for the work; or they may wish this to be a preliminary, leading up to a final competition. Whatever is their wish does not appear plainly upon the surface of the declaration, and every one is at sea, and the prospect of a miserable failure is imminent. The prizes are quite liberal for preliminary work, if that is what is wanted, but the statement speaks vaguely about specifications, proposals, etc., and no one knows what to submit; indeed it would seem that in order for any one to satisfy himself that he is fulfilling the requirements of the programme he would be required to furnish full drawings, specifications, details, and a proposal for the erection of the work.

As the building is of so much importance, and is to rival any of a similar kind in the world, it is to be hoped that some definite and satisfactory revision of the programme will be made, and made in such a manner that the best talent in the world will be brought into the competition. If such is not done the prospects are that it will end similar to some other recent Philadelphia and New York competitions.

BROOKLYN. During the last few months there have been numerous large building schemes projected in the City of Churches, among which is the new Montauk Theatre, Messrs. McElfatrick & Son, architects, which will be built according to the most *fin-de-siècle* methods of construction. It has an excellent three-story stone façade on Fulton Street, running back one hundred and twenty-five feet to DeKalb Avenue, with eighty-eight feet frontage on the latter. It is being built by a stock company, and will be used as a theatre, with bowling alleys and billiard parlors in the Fulton Street wing.

Over in the vicinity of the Wallabout Market can be seen the chaos and *débris* occasioned by the demolishing of the old market buildings to give place to the new market houses (Mr. W. B. Tubby, architect), which will consist of nine elegant structures, each occupying a block of one hundred feet by two hundred feet, having a frontage of one thousand feet on Washington Avenue. These buildings, which are to be built under the supervision of the Department of City Works, will cost between thirty-five and forty thousand dollars each, and will be built as nearly fireproof as possible.

The city is doing no little part of the local building, as it is about to enlarge the Hall of Records, and has recently appropriated the sum of forty-five thousand dollars for the improving and placing of an elevator in the City Hall, besides having several large school buildings under way, averaging one hundred thousand dollars each.

CHICAGO. Jack Frost played an expensive joke on at least two new Chicago buildings. One of these is the Tegnard, a six-story office building on the river just at the head (or foot) of Wabash Avenue. The construction is "slow burning," according to the definition in the Chicago building ordinances, and the five stories of piers on the two street fronts are carried on I beams over the store fronts. These piers are sixteen inches thick in second story. The second-story brickwork was laid in cold weather when the mercury stood at about 10° Fah. below zero.

Salamanders were sparingly used while laying the bricks in hot lime mortar, but the common brick for backing, second hand, water soaked, and frozen solid, were laid without first being heated. As a natural result when the frost came out (which occurred about the time this building was ready for roof), the piers came out, too, or rather, the bottoms of the piers were thrown off the supporting beams from one inch to four inches, making a very noticeable batter in the second story. Six of these, the worst of the piers, five to six feet wide, were shored up at third-floor level and the second story was torn out and rebuilt. The terra-cotta band course, covering beams at second-floor level, were badly displaced and a few pieces crushed. The terra-cotta lintels over windows were crushed in several cases. These were coverings for small I beams. When the frost came out the joints of the brickwork compressed enough to crush the terra-cotta lintel coverings and bend down the heads of window frames. It was noticeable that the piers damaged by frost were five and six feet wide, while the narrow piers, three feet wide, which were built with more care and *not* with joints, seven eighths inch thick, were but little affected. It would seem to be a point worth while calling to the attention of architects that in cold weather brick should be laid with close joints, and that the brick should be so dry that they will absorb moisture from the mortar and enable the latter to "freeze dry." This is mentioned because the writer has seen walls in which the mortar had not set two months after laying, and because the second building referred to above had to have two or three stories taken down to foundation and rebuilt.

In justice to the architect of the Tegnard Building, it should be stated that he warned the owner and contractor against the use of the old brick, but was not allowed to dictate in the matter.

ROCHESTER. The building outlook for Rochester this season is exceedingly dull. Very little new work has come into the offices lately, though much of last season's work is now being finished.

Considering the hard times, last year was an unusually busy one for the brick-building business. The Chamber of Commerce Building is the largest of the buildings now being finished. It is thirteen stories high, fireproof, steel construction, and is built of the Eastern Hydraulic Pressed Brick Company's buff brick, with white terra-cotta trimmings, furnished by New York Architectural Terra-Cotta Company.

intelligent leadership the value of labor and the equitable wages, in accordance with the state of business, will be better known and concessions on either side more readily made.

If the unions can so train their men in skill and faithfulness that the production of the average union workman is one third more than the non-union, the world will quickly appreciate it and pay him accordingly. The walking delegate should feel it incumbent upon him to see that a fair day's work is given for a fair day's pay. Under such circumstances the employer would become the steadfast friend and supporter of the trade union, and May 1 would be only a reminder.

R. N. Buell.

Vancouver, B. C., March 14, 1895.

Editor The Brickbuilder.

Dear Sir, — I wish to say that I am much pleased with the changes and additions which I find in The Brickbuilder. Placing an index of contents on front cover and dividing them under the different headings is an improvement which every busy man must appreciate. I would like to see a larger proportion of your space devoted to my particular department, that of the mason contractor. I think I may say this without appearing selfish, though I know nothing about the proportion of mason contractors on your subscription list. In your January number less than two pages of the twenty-four are devoted to the brickbuilder proper; the others are of more practical use to the men who design our buildings and specify what we shall use in them. The whole journal, including advertisements, is of general interest to contractors, but we would like to see more in our own particular corner.

I will take the liberty to give you some incidents in our experience as mason contractors, and ask you at some future time to enlarge upon them and answer some questions concerning them. The first is suggested by your article on foundations and building beside old buildings which have poor foundations.

We would like to know something about the by-laws of different city corporations with reference to the foundations of buildings. Here they regulate the thickness of the walls, but not the depth, and in several instances buildings have been put up with shallow or shoddy foundation walls built to the line of an adjoining owner, and thus depreciating the value of his lot for a building with a basement. We recently completed a brick and stone block with one side wall 120 feet long resting on a very shallow foundation, which has a stone footing course about twelve inches thick projecting six inches on the adjoining lot. This was designed by an architect who is a F. R. I. B. A. Without the footing the wall would hardly be safe. We would not care to put in a basement next to this building. We had one contract of this kind, a brick store with stone basement next to a brick block with a shallow foundation badly built. The owner of the new building, who estimated the risk as but trifling, kept the excavating in his own hands, which was very fortunate for us. The soil was wet and treacherous. Before he had removed much of it, the old building commenced to crack, and in a few minutes the whole side fell out. It was fortunate that the floors were not heavily loaded, for then the whole block would have been wrecked. The owner of the new building had to rebuild the wall and pay damages. The wall which fell was apparently a good wall above ground; a photograph would have shown no defects.

In your article on scaffolding you mention the fact that contractors too seldom consider the safety of either themselves or their employees. The Employers' Liability Act of this province is such that every contractor who is at all prudent is obliged to consider this question of safety.

We have tried several systems of accident insurance for employees. We now have a policy which seems very fair. The premium (annual) is based upon the amount of wages paid annually. We pay one and one fourth per cent, which gives our men one half their wages for a term not exceeding twenty-six weeks if they are totally disabled by an accident either in or out of working hours. In case of the accident causing death, their heirs get full wages for twenty-six weeks.

This is the best protection in the way of insurance in Canada, and *it* is not what we should have; a contractor is not safe unless he has his sub-contractor's men covered. Here a difficulty arises in determining the amount of wages paid out by the sub-contractors. Evidently there is room for something better in the way of accident insurance. Our policy does not cover accidents to the outside public. The city by-laws usually require builders to protect the public. This would not be a hard matter, if the public would keep sober. Unfortunately, however, there are in every city men who are apparently on the lookout for trouble. It is this worthless, drunken class who are most apt to trouble a builder, — men who have nothing to lose and who have, or think they have, a chance to make a contractor share up his profits, which are small enough in these days of keen competition.

It is impossible for a contractor to keep the street entirely clear of obstructions. When he least expects it some one stumbles over a stone or piece of board, receives a slight injury, and at once puts in a claim for heavy damages, which claim is usually reduced to an amount which it is well known is less than the expense to the contractor of a lawsuit, even should he win it. Such claimants seldom have means to pay court costs in case they lose the suit. If the contractor is wise enough to look at such a case from a financial standpoint only, he will settle at once rather than risk a suit. We can buy a policy which will protect us from such claims, but the best are not satisfactory. I'm sure that some information on this question of employers' liability laws and insurance will be very welcome and of much practical value to both brick builders and brick makers.

Yours respectfully,

A British Columbia Brickbuilder.

Editor of The Brickbuilder.

Dear Sir, — I am glad to note the interest expressed by Mr. A. H. Cope in my first article on "The Use of Brick in Domestic Architecture," and hasten to explain the points which he wished elucidated.

The little cottages shown as suggestions in my article have never been built, and are simply suggestions, not only in point of design, but in the matter of proposed construction for the economical use of this eminently durable and desirable material.

Mr. Cope asks whether the walls are to be bonded with metal ties or brick headers. In reply to this I would say that the method proposed was the tying of the two 4″ walls by means of some metal tie, an excellent form being the "Moss Wire Wall Tie," which is made either of copper or galvanized iron, galvanized iron being in the present instance recommended on the score of economy. The walls would, I think, be sufficiently stable under these circumstances, provided they did not exceed eighteen or nineteen feet in height. This would allow for a two-story building. In the event of any large girders being used, it might be well to re-enforce the walls at their bearings by an increase of the inside wall to 8″.

Mr. Cope is probably both right and wrong in the matter of dampness in the walls. While undoubtedly the greater part of the moisture that would show itself on the inside of a solid brick wall would be due to the difference in temperature of the wall and the air in the room, still, under severe conditions, experience has shown that outside moisture will force its way through a solid brick wall of considerable thickness, while it undoubtedly rises several feet from the ground unless some kind of damp course is provided. In a hollow wall, such as is recommended in the case of small brick dwellings, there would be no opportunity of this driving through of the moisture, while the air space would of course serve to equalize the temperature in the wall, and so prevent the condensing of moisture on the inside surface.

Very truly yours,

Ralph Adams Cram.

It is intended for general office purposes, with stores on first stories, and is architecturally divided into three stages, — the first three, the next eight, and the two upper floors which are to be used for Chamber of Commerce purposes. It is surmounted by an ornate and heavily bracketed cornice. The first three stories are in brick and terra-cotta used alternately in stripes. The second stage is quite plain, but very good; it is divided into panels with pilasters between, and the stories are separated by panels of moulded terra-cotta. The Chamber stage is entirely of terra-cotta, boldly modelled. The porous terra-cotta floor, etc., are furnished by Staten Island Terra-Cotta Lumber Company. Architects, Nolan, Nolan & Stern.

The new Central Police Station and Woodworth Buildings are two other fireproof structures which are almost complete. The former is four stories cut stone and New York hydraulic pressed brick. Architect, Herbert W. Pierce.

The latter is six stories with basement and sub-basement. It covers about the same area, and has pressed brick and terra-cotta front. It is erected to be a first-class manufacturing building, and is one of the best examples of this kind of building in the city. Architects, Ellis Bros. Both of these buildings are iron construction.

The Stillson Street, No. 2, Fire Engine House is another good example of brick and terra-cotta work done here lately. It is in style Flemish Renaissance, and is three stories high, and has a richly moulded terra-cotta entrance, and the dormers and window arrangement make it the most attractive building of its kind in the city. Architects, Nolan, Nolan & Stern.

Work now on in the offices for which the contracts have been or are about to be let are, block for C. B. Woodworth, State Street, six stories, 100 x 135 feet, fireproof. Building for Mr. H. H. Craig, Paul Street, seven stories, 132 x 155 feet, and annex 40 x 60 feet, fireproof, brick and terra-cotta. Architects, Ellis Bros. Building for B. H. Clark, West Street, 50 x 100 feet, four stories, slow burning. Architect, C. F. Crandall.

HARTFORD, so long known as the home of the insurance companies, is about to have an addition to its list of buildings devoted to this business.

The Travelers Insurance Company have, for some time past, contemplated the erection of a larger and more modern building than the one they at present occupy; and I understand that Mr. Ernest Flagg, of New York, has been commissioned to prepare the drawings for a building which will provide a number of stores and offices, and also better accommodations for their own offices.

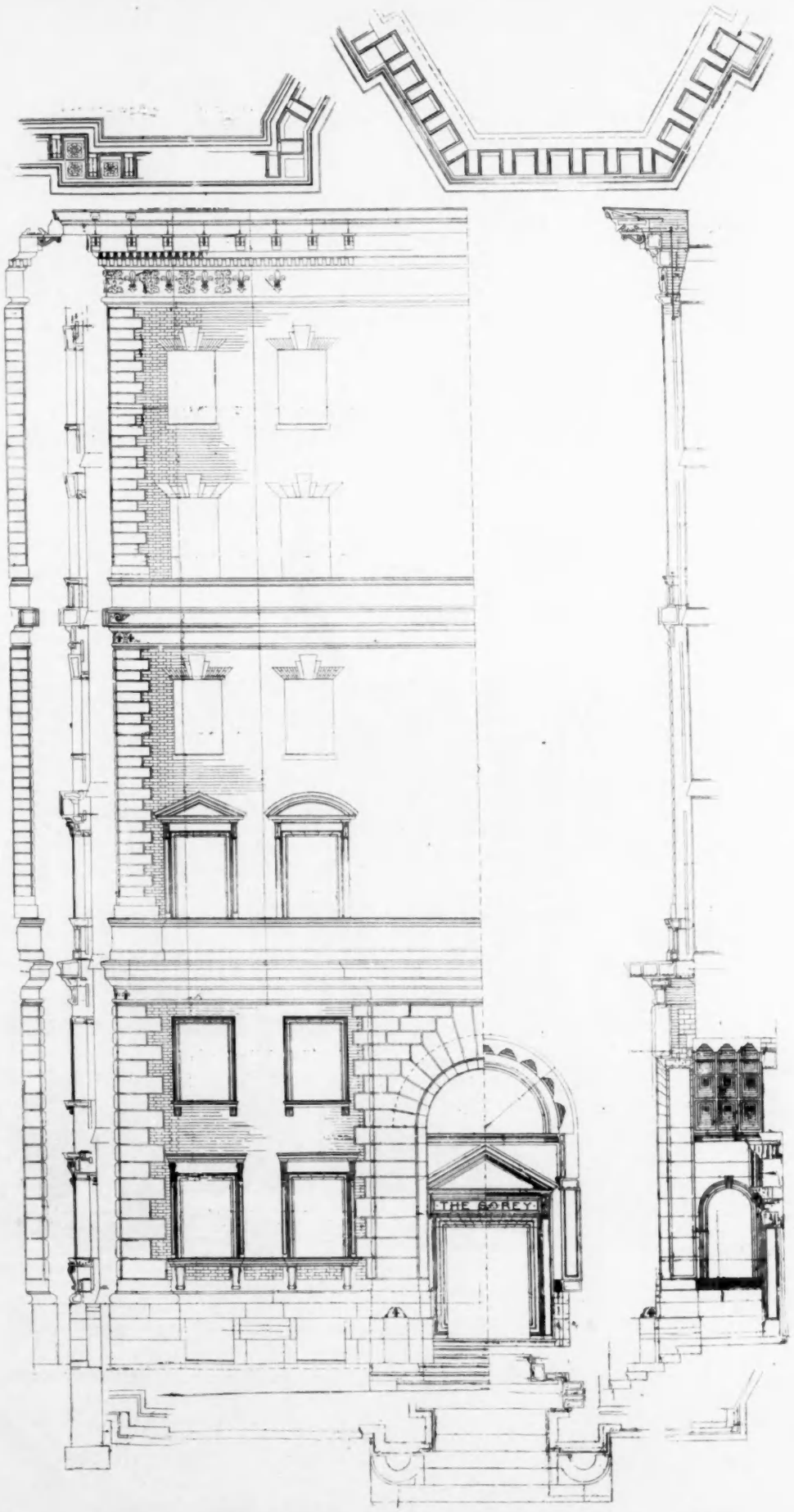
The design for the Hartford Life and Annuity Company's new building is from the office of Mr. F. R. Comstock of this city, and, to judge from the drawings, will certainly be quite an addition to the architecture of Hartford. The building is to be five stories high, and will be the first building in this city where the steel skeleton construction has been adopted.

The first story is to have two large stores, which will front on Asylum Street, and are separated by the main entrance, which is to be quite a feature of the Asylum Street façade.

The exterior of the first and second stories is to be built of Indiana limestone, and above this will be buff brick with terra-cotta bands, quoins, pediments, etc., the whole to be capped with a large projecting cornice of terra-cotta. The building will cost not less than one hundred thousand dollars.

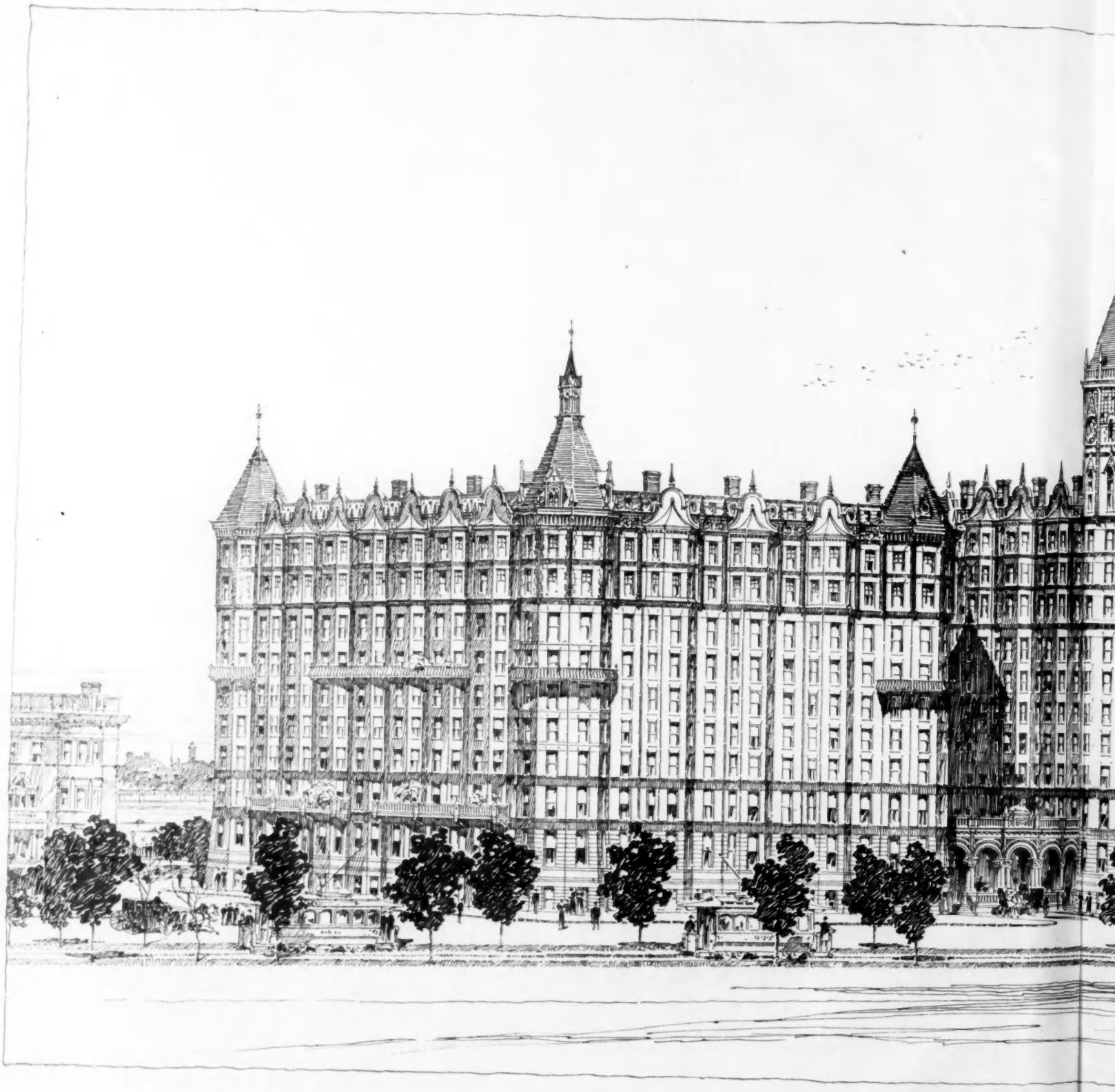
Within the last few months this city has received three large tracts of land, accompanied by generous funds, which are to be devoted to extending the present park system; and following this we expect some extensive improvements in the immediate vicinity of these parks. Already the movement in this direction is to be seen in the block of twelve houses which Mr. George Keller has designed for the Hartford Real Estate Improvement Company.

There are quite a number of large alterations and additions to the business premises this spring, which with the usual spring work is certainly encouraging, as all the architects seem to be very busy.



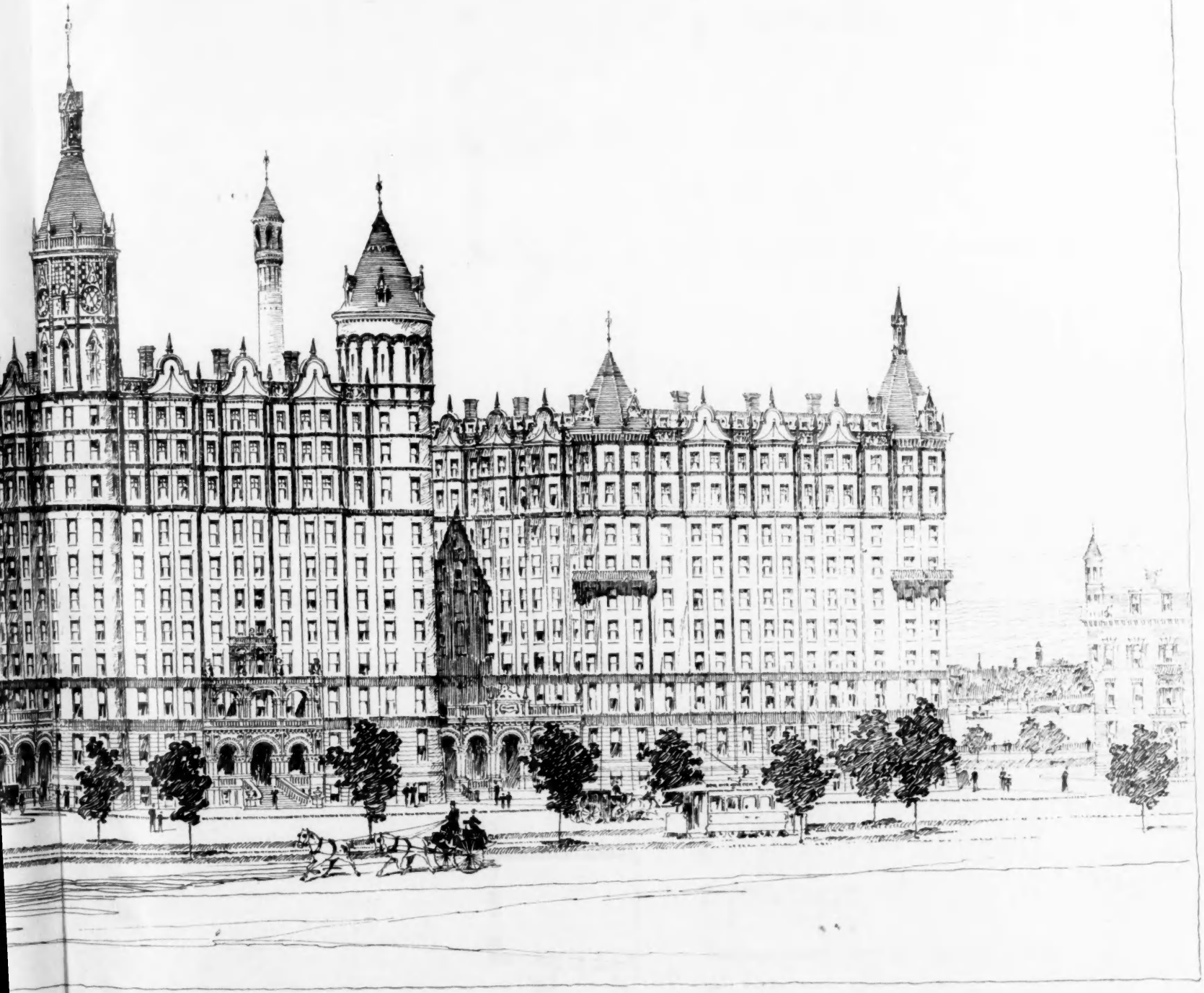
DETAIL OF APARTMENT HOUSE, BROOKLINE, MASS.

ARTHUR H. BOWDITCH, ARCHITECT.



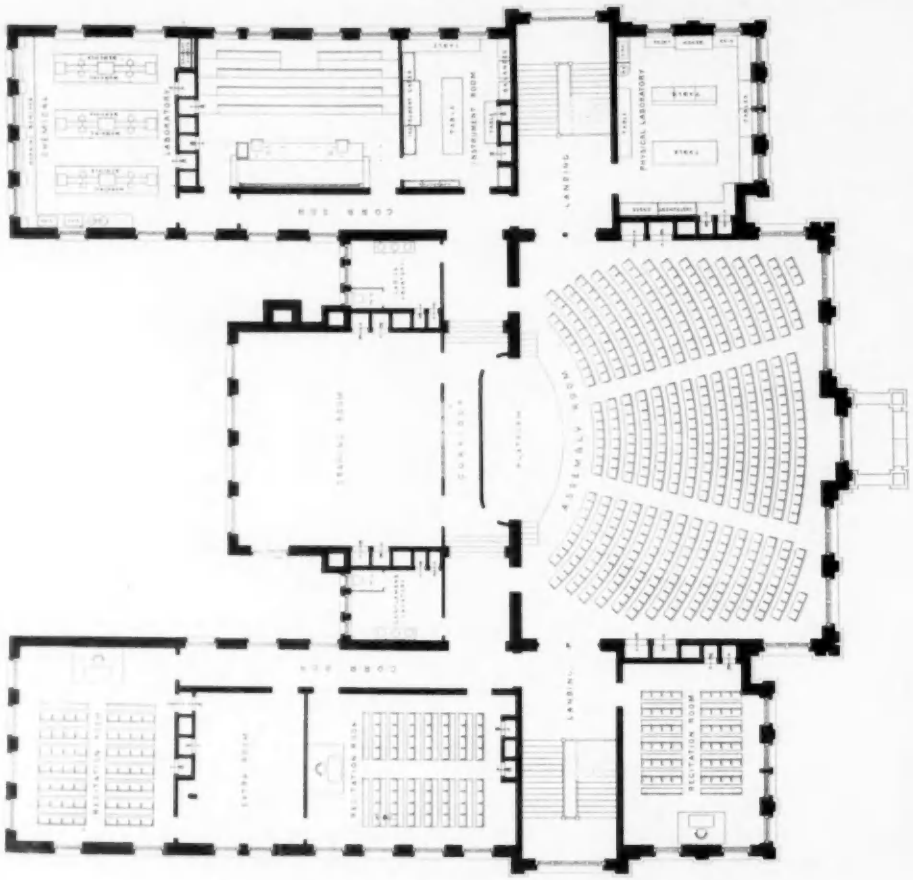
PROPOSED NEW BACK BAY HOTEL,

J. P. PUTNAM, ARCHITECT

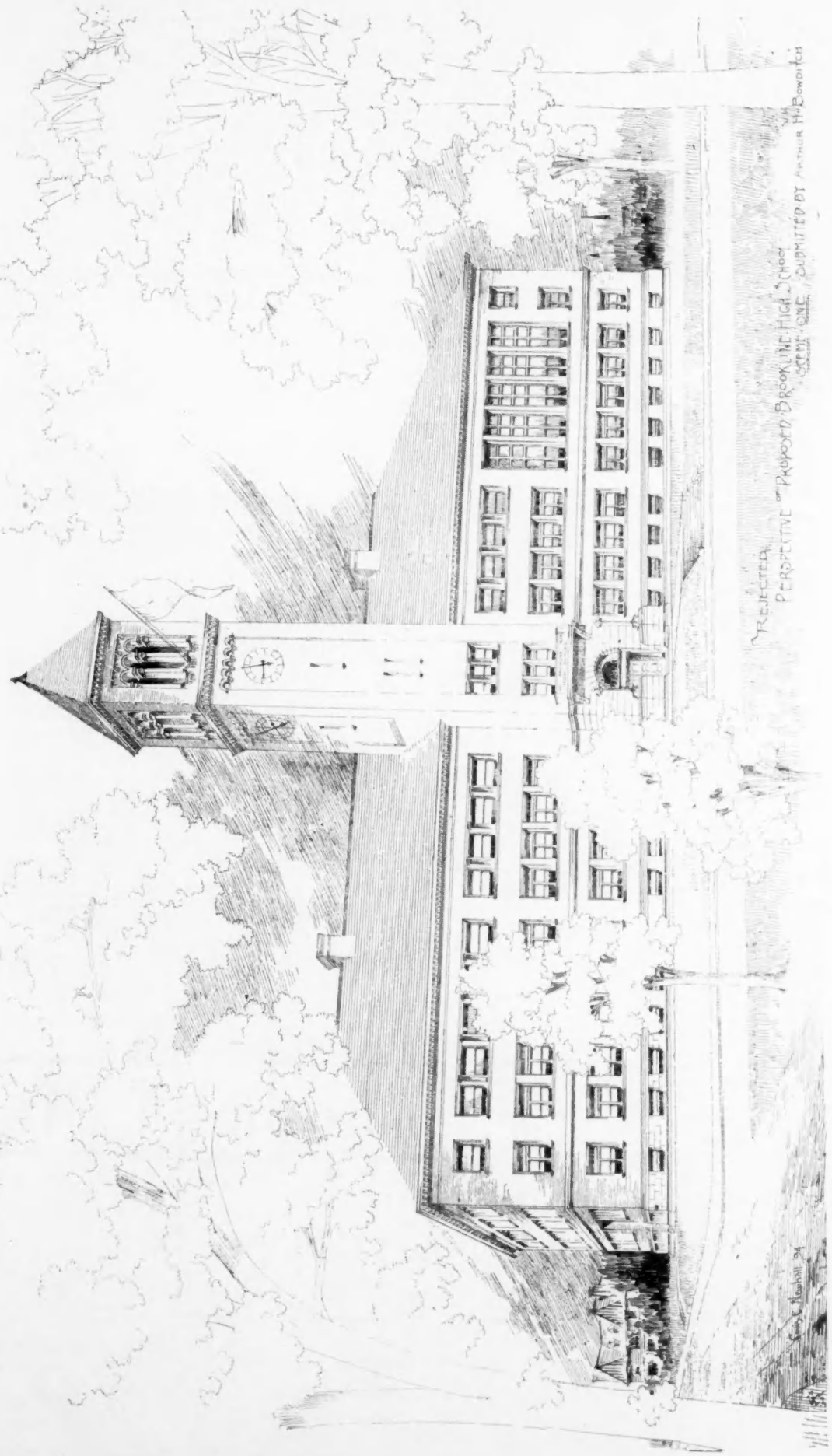


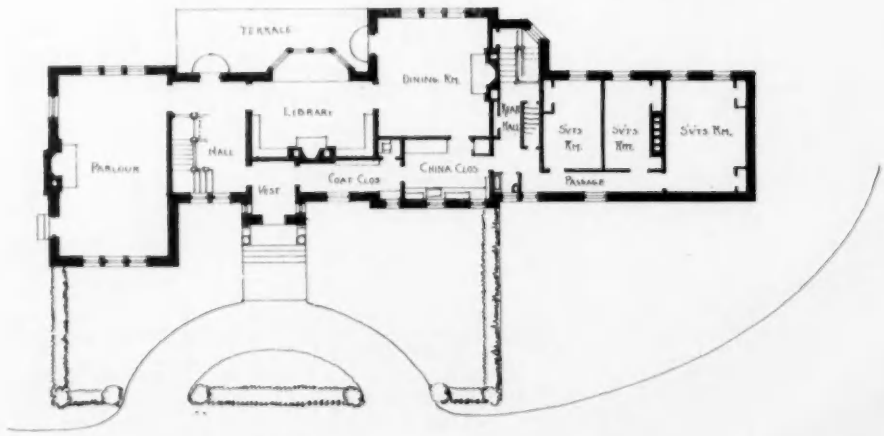
ACK BAY HOTEL, "THE COMMONWEALTH."

, PUTNAM, ARCHITECT, BOSTON,



FLOOR PLANS PROPOSED HIGH SCHOOL, PLAINFIELD, N. J.
W. & G. AUDSLEY, ARCHITECTS.

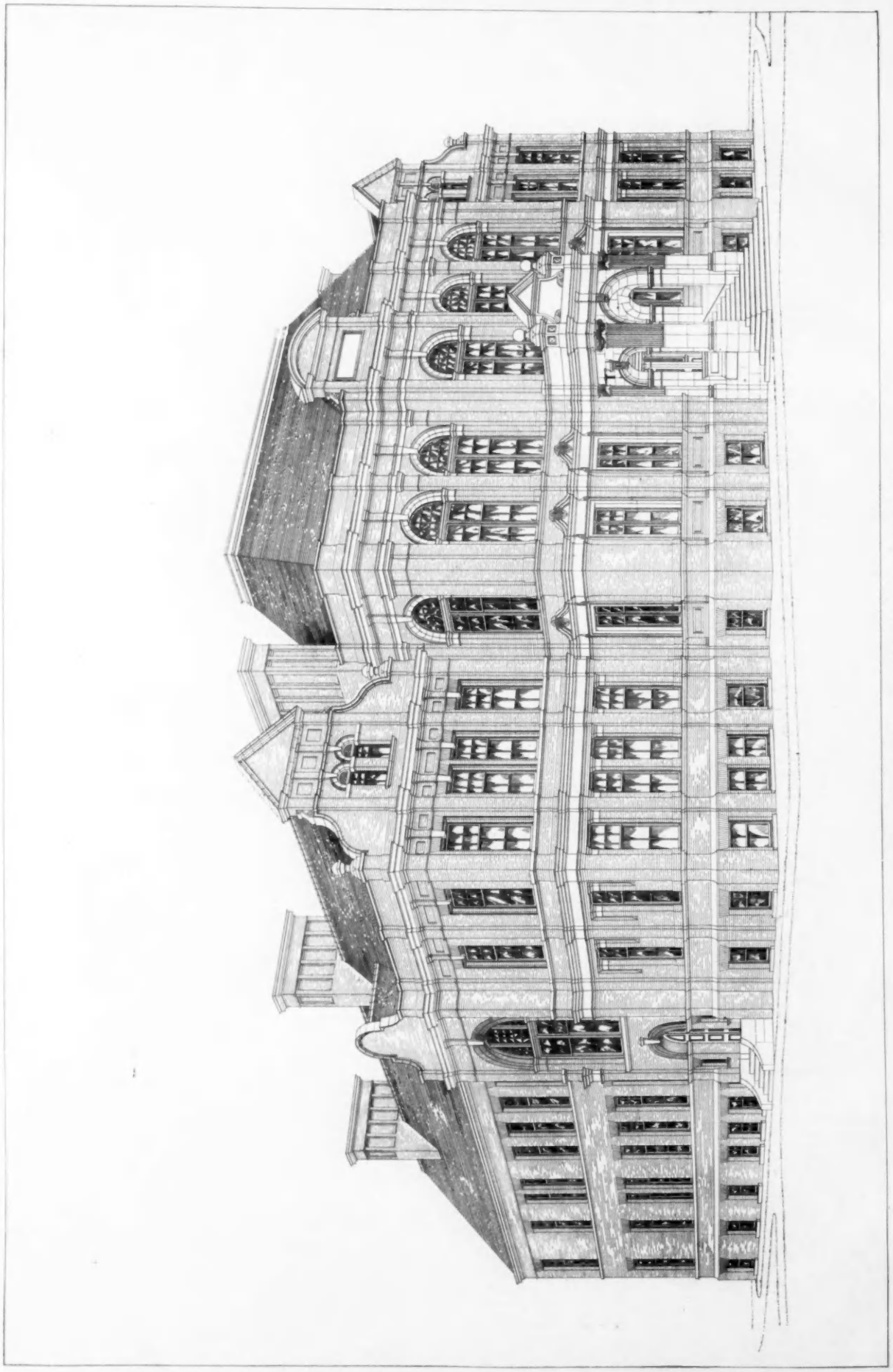

REJECTED
PERSPECTIVE OF PROPOSED BROOKLINE HIGH SCHOOL
SCALE ONE INCH = ONE FOOT
SUBMITTED BY ARTHUR H. BOWDITCH



"FIRST STORY PLAN"
SCALE

COUNTRY HOUSE FOR HENRY B. CABOT, BROOKLINE, MASS.

STURGIS & CABOT, ARCHITECTS.



A DESIGN FOR THE PROPOSED HIGH SCHOOL, PLAINFIELD, N. J.

W. & G. AUDSLEY, ARCHITECTS, NEW YORK.